Issue No. 22

June 1960

AIR COOLED NEWS

PUBLICATION OF

THE H. H. FRANKLIN CLUB

438

VOL. VIII No. 1

AIR COOLED NEWS

June 1960

PUBLICATION OF

THE H. H. FRANKLIN CLUB

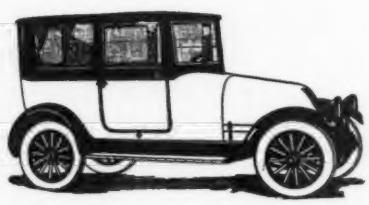
OFFICERS AND DEPARTMENTS

Dr. George S. Boyer	President
David T. Doman	Vice President
Miles S. Amick	Treasurer
David K. Bausch	Corresponding Secretary
A. H. Amick	Editor
Henry C. Courten	Information Center
J. van Groningen	European Editor

ADVISORY BOARD

Kenneth F. Barton
Earl Buchman
Emerson S. Clavel
Samuel M. DeBolt
Walter W. Fife
Harold M. Finley
Raymond Keeler
Stanley D. Wilkinson

Membership and Treasurer's Office: Box 535, Cumberland, Maryland
Corresponding Secretary: 252 North 7th Street, Allentown, Pennsylvania
Editorial Office: Cumberland, Maryland



Mighty few of ACN readers would ever qualify as story book Private Eyes. Just for the Heck of it we used for our cover emblem in the last issue the original paper weight from which our car emblem was developed So far not a soul has called our attention to it, so we can presume that no one noticed the difference.

We thought it might be of some interest to picture this original souvenir paperweight and chose this means of doing so. The original dies were found in dusty storage by an executive of Whitehead and Hoag who happened to be a classic car bug and they then made the requested changes in the dies that provided our present car badge.

Correction: Tom Hubbard called us on this.

The picture on the opposite page is our much loved Edie and Stan Wilkinson. They were heading to a rendevouz in a nearby park with photographer Ozzie Lyons.

Unknown to them Ozzie overtook them and caught this wonderful unposed picture, vastly superior, in this editor's eyes, to all the later posed shots.

The Franklin surely was, and still is, controversial. There was much argument even inside the family. Probably no Franklin produced as much controversy within the clan as the Series 9. The Chief Engineer is said to have resigned because of this car and gone on to form his own company. Whatever the merits of this car may have been it undeniably sired the largest production in the history of the company.

Carl Doman has written us an interesting story of this famous Franklin and a considered appraisal of its own worth and of its influence on later and more "aggressive" Franklins. The editor will, for once, refrain from expressing his own opinions.

Last year saw the air cooled car off to another start in this country. Long may she blow!

Now in 1960 a British motor car builder asks his prospects, "What's the most brilliant motoring idea you have ever heard of?" This "most brilliant idea" turns out to be our old friend, the Cross Engine. Fifty eight years after the first Franklin cross engine this brilliant principle has been "discovered"

We can hardly say the Morris 850 is a "copy" of the early Franklin, Premier, Marion and other cross engines for its interesting combination of engine, clutch, gearbox and axle bear no resemblance to those earlir efforts.

Alec Ulmann writing in THE BULB HORN about this "radically new" British car brings out, with his usual careful research, that the idea of combining cross placement of the engine with front drive was tried out by Schwenke in 1902 in Germany. He also refers to the once well known Christie of around 1908 which used the same idea in America. Christie's original patent apparently dates from 1904.

We do think that it is another interesting example of the extent to which engineers have been looking to the past for ideas. The advertising boys like to give the idea that all these many returns to older principles are "revolutionary" engineering discoveries, their writings sometimes sound like news from Russia, however we do not believe that the engineers who readopt so many old ideas are in total ignorance of the past.

Ordinarily we do not annoy car dealers for "demonstrations" unless we are "in the market", usually at ten year intervals, but we do feel that we just must try out this modern British Cross Engine.

Somebody Goofed

Fifth Month 25, 1960

Mr. Miles S. Amick
Hill Crest Drive
Cumberland, Maryland

Dear Miles:

The last issue of the ANTIQUE AUTOMOBILE carried a revised list of OFFICIAL CAR CLASSIFICATIONS and this list was also sent out with the AACA Spring Meet notice. Through an unfortunate typographical error, the name FRANKLIN was omitted from the specified list of American Classic Cars.

Please accept my apology, as Technical Vice President, for this error and please inform your H. H. Franklin Club members that their cars have not been deleted from the Classic Car group in AACA. I am asking our Editor to insert a correction notice in the next issue of ANTIQUE AUTOMOBILE.

The AACA Membership Roster will be published shortly; this will have the typographical error corrected and will show Franklin cars in their proper place. I might add that it has always been the policy of AACA never to remove a car from an established place of honor or to rule them out of competition or recognition once admitted.

My best to you and Mrs. Amick; hope to see you soon again.

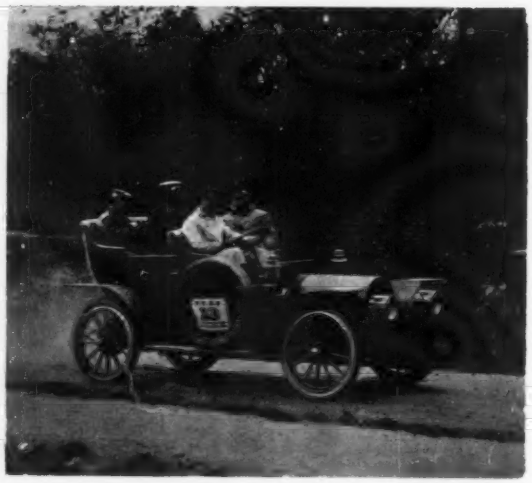
Cordially,

Les

Leslie R. Henry
157 Ridgefield Road
Newtown Square, Pa.

The Bretton Woods Run

The Famous Eight-Day Struggle of an Air-Cooled Automobile With Water-Cooled Automobiles



The Winning Franklin. A 1909 28-h. p. Model D.

How the Air-Cooled Franklin Won

The recent Bretton Woods endurance test of the Bay State Automobile Association was the most severe in the history of automobiling in America. There were twenty-one starters, all water-cooled except the Franklin. A penalty of one point per minute was made for adjustments, replacements or stopping the motor. Each automobile carried an observer appointed by a competitor. The run was from Boston to Bretton Woods, New Hampshire, and return, 360 miles, without stop, except one hour for luncheon at Bretton Woods.

In all New England a more difficult route could not have been selected. The mountains required long stretches of low gear work, and because of the prolonged drought the roads were abnormally rough and dusty.

It was expected that the route and the rules were so severe that every contestant would be penalized in the first round of 24 hours. But not so. The Franklin and six others came through with perfect scores and were immediately started out for the second round. Soon all but the 28 horse-power Franklin and two others, one a 35 horse-power, the other a 50 horse-power, were out. It then became a battle to the finish, and for days the Franklin stood every possible test put upon it in an effort to break its perfect score. But to no avail. For 95 hours the Franklin kept at it, covering 1607 miles, when the run was declared off. The Franklin finished in perfect condition and with a perfect score. Not a single adjustment had been made. This wonderful test, this splendid official victory for light weight and air-cooling, is only another testimonial to the supremacy of Franklin principles.

This is the sixth year of Type D. It is a tried and proven standard,— a touring-car, a city car, a family car,— the ideal for all around service, and as beautiful as it is able.

NEWSPAPER COMMENTS
Authenticating Franklin Supremacy

"The Franklin was the only air-cooled motor car in the run. She displayed no ill effects of the long, continuous work. She climbed Mt. Agassiz, Crawford's and Francen's notches with the same freedom and abandon of any water-cooled engine, and never warmed up. It was certainly a great exemplification of the claims of the company that the air-cooled system is as perfect as any devised. Structurally she stood the test as well as did any of the others, and yet she was the lightest weight car in the run."—*Boston American.*

"There have been Glidden tours that needed several days and many miles of added driving to eliminate the winners from big fields of starters, but no endurance run of the one day type has ever required so gruelling a postscript of road plugging to evolve a winner as has that of the Bay State Automobile Association.

The Franklin was the only air-cooled car in the test, and it went through with flying colors."—*The Automobile.*

"Its duplicate has yet to be seen."—*Boston American.*

"The work of the Franklin air-cooled car in this run is exciting much favorable comment. It had been thought that the route was not particularly favorable to an air-cooled motor owing to the many grades that had to be climbed on slow speed. The Franklin, however, has come through each day's trip in first-class shape. Not for a minute was the motor stopped except at controls, and not a single adjustment, repair or replacement was made during eight days."—*Boston Transcript.*

"The Franklin, the only air-cooled car in the contest, did its work well and thoroughly. Up the hills it went without heating the motor, and sandy and rutty roads made no difference with it."—*Boston Globe.*

"The contest has been the most severe of the kind ever held in this country. It is the first time engines have been called upon to run continuously for twenty-four hours in an endurance run."—*Boston Herald.*

"The air-cooled car went the entire distance of 1607 miles, doing everything that was asked of it, and made every control well within its running time, finishing with an absolutely clean score."—*Boston Herald.*

"One of the most remarkable motoring contests in the history of the sport."—*Motor Age.*

"The Franklin, by the way, is the only air-cooled motor in the contest, and up to date she has certainly performed with exceeding credit, experiencing no trouble with her cooling system, demonstrating beyond cavil that the air-cooled principles are capable of as good results as the water-cooled."—*Boston American.*

"It was, in a way, a battle between air-cooled and water-cooled motor vehicles, for the Franklin is the air-cooled, while the others are water-cooled cars. The Franklin at all times was there for the test.

The makers of this car are strong supporters of the air-cooling method, and, notwithstanding what others do, they stand by their original love. An examination of the car at the garage yesterday morning showed that it was as fit as ever."—*Boston Journal.*

"The longest Glidden tour ever held was last July, when the cars traveled about 1660 miles. In this, adjustments were allowed, and eleven days taken in which to make the trip. In the Endurance Run that has just finished there was little more than one week of road work, and yet the cars covered all but 57 miles of the distance done in the Glidden tour. The roads traveled in the local run were far and away harder and worse on the cars than were those of the Glidden tour."—*Boston Herald.*

Our appreciation goes to member Frank W. Knowlton of Charlotte, North Carolina, for the little booklet describing this early run and for the most excellent picture on this page.

On the back of the picture is the description in member Knowlton's hand; "The 1909 Model D Franklin which completed the Bretton Woods, New Hampshire Endurance Test of 1607 miles, September 23-October 1, 1908, with a perfect score. The test was sponsored by the Bay State Automobile Association of Boston, Massachusetts.

The driver is Clayt Carris, beside him is Johnny Burns as his mechanic. The gentleman in the rear with hat is Mr. A. B. Henly, then manager of the Franklin Automobile Company, Boston. The fourth person is F. W. Knowlton, age 23, a Franklin salesman in Boston, who rode the entire 1607 miles of the Endurance Test as an observer in other cars than the Franklin."

Franklin Series 9

by Carl Doman

My Father's company, The Dyneto Electric, began building the single unit starter-generator for Franklin cars in 1913. Consequently, he was well acquainted with the plans of Franklin's Engineering Department for several years in the future. If my memory is correct, in 1913[1] father first mentioned to me Franklin's plans for a new car to be called the Series 9.

I specifically recall that father had been successful in selling Ralph Murphy, Chief Engineer, and Louis Stellman, Assistant Chief Engineer, on the use of a single unit starter-generator with the armature mounted directly on the crankshaft. The original experimental cars first tested in 1913 had this direct connected single unit Dyneto starter. It was later abandoned when it was found that the crankshaft was so limber (1⅝" O.D.) that the armature would strike the pole pieces causing a very loud noise.

The direct mounted single unit starter was replaced with a single unit Dyneto unit connected to the crankshaft with a chain ratio 3 to 1.

Production of the Series 9A[2] began in mid 1916 replacing the much heavier Series 8 car. Mr Wilkinson in particular was convinced that automobiles were too heavy and the only solution was to start from scratch and design each part for minimum weight and greatest strength. This approach was followed in the Series 9. This does not mean that the Series 8 was carelessly designed and needlessly heavy—It was a leader in modern transportation, but progress demanded a new design.

The Series 9A when first introduced used aluminum fenders and bodies. Shortly after the cars were in the hands of customers and operated on all kinds of roads, it was found that the aluminum fenders were easily damaged. Therefore, the engineers specified steel for the fenders and this problem was eliminated. However, the weight of the vehicle was increased by 75 pounds, much to the dissatisfaction of Mr. Wilkinson.

The general design of the Series 9 followed quite closely the proven principles of the Series 8. The engine was a 6-cylinder in line connected through rubber universal joints to a three-speed transmission, the drive line connected to the transmission to the unique rear axle, suspension was through full elliptic springs. The entire car was tied together by a 3-ply laminated wood frame.

In the following discussion the "whys" of each major component will be given- part from memory and part from the few records available. Unfortunately, the few men now living who were intimately connected with the management of the Franklin Automobile Company cannot recall interesting details pertaining to the design, the manufacture and servicing of this wonderful vehicle.

ENGINE

I personally can recall more features of the engine than any other parts of the car because my first job at Franklin in 1921 was testing Series 9 engines in the "Dog House" (a wear test area with three dynamometers).

Six individual valve in head type cylinders were mounted in line on an aluminum crankcase. The bore was 3.25" and stroke 4" giving a piston displacement of 199 cubic inches. The brake horsepower was advertised as 30[3] at 1750 R.P.M. and an S.A.E. horsepower of 25.3.

Note: S.A.E. Horsepower $\frac{\text{Bore} \times \text{Number of Cylinders}}{2.5}$

I witnessed many dynamometer tests, but the maximum power I observed was 25 at 1750 to 2000 R.P.M. This, of course was the net output as in those days the fan and all accessories were in operation during the tests. Furthermore, the engine could not cool properly on the dynamometer without auxiliary air.

Of course, on the highway the forward motion of the car supplied the extra pressure for cooling.

The multi-blade, or 64 vanes 3½" wide, fan was mounted in the flywheel and sucked the cooling air down through the fins on the cylinders. The literature designated the fan as a Sirocco type of 2200 cubic feet per minute capacity. This statement, of course, means nothing as a Sirocco fan is quite accommodating in that it delivers air proportional to its speed for a given resistance. Nevertheless, I would rate the fan at approximately 2200 C.F.M. at 1750 R.P.M. or 45 M.P.H. car speed. Since the resistance of the air passage on the Series 9 engine was quite restricted approximately 7 inches of water pressure was required to move the air at 1750 R.P.M. Therefore, with an air efficiency of 40% for the fan 6 horsepower was absorbed in the fan. Had the engine been used at higher speeds (3000 R.P.M.) the power absorbed would have been approximately 30. In other words the fan would have been a governor limiting the speed since all the engine's power would have been absorbed in driving the fan.

Each cylinder had 52 steel flanges or fins cast into the iron, which extended almost the entire length of the cylinder. The total cooling surface per cylinder was approximately 575 square inches. Unfortunately over 80% of the area was on the barrel and only 20% around the combustion chamber and exhaust parts. This explains why the cooling of the Series 9 engine was quite poor and its power output so low.

Later Franklin engines were designed with the greatest cooling area on the combustion chamber and the exhaust ports since 75% of the heat units lost in cooling passed off through the cylinder head and only 25% in the barrel cooling surface.

Often times the Series 9 engine was criticized because the cooling fan sucked the air through the cylinder air passage. It was claimed that the fan efficiency was low because of its location and that it would have consumed less power if it pushed the air as did later Franklin engines. This is untrue since the Series 9 engine cooled poorly because the cylinder itslf lacked proper finning and not because the air was sucked through the passages. Sometime later, when I was Research Engineer, I ran tests that indicated a fan within limits (up to 10" H O) was as efficient sucking as pushing air, provided there was no serious turbulance in the system.

In 1960 a 199 cubic inch engine would develop approximately 130 horsepower at 4500 R.P.M. To continue to develop this high output an extremely rigid structure is necessary. If a Series 9 was equipped with a modern design of cylinder with aluminum heads, modern camshaft and intake system, it could develope 130 horsepower at 4500 R.P.M. also. However, at this load and speed its life would be only a few minutes. The crankcase, the crankshaft, the piston or the connecting rod would fail. They would fail because the design was inherently weak and very susceptible to distortion. The crankase itself lacked rigidity. In the crankcase operating a very limber crankshaft without counterweights to reduce bearing loads, the entire design could be analyzed and its weakness demonstrated. But, we must in fairness take ourselves back to 1916 with the car concerned, when our knowledge of crankshaft stresses was very limited.

1. ***This date is probably in error as Series 4-5-6-7 and 8 were still to come at that time.***
2. ***It was introduced as Series 9, became known as 9A after later models followed.***
3. ***We have checked two dozen advertisements over an eight year period and have found none that gave ANY horse power rating. All specifications we have seen read 25.3 H.P.***

In 1960 a 199 cubic inch direct air cooled engine could be designed which would match the performance and life of any water cooled engine. Furthermore, it need not cost more to build, to operate or maintain. However, we could not make this claim if Franklin had not carried on the pioneering work until it built its last cars in 1934.

The carburetor used on the entire Series 9 production was designed by Mr. Wilkinson. It was manufactured by Franklin. Certainly by today's standards it was most simple, yet it did an outstanding job in mixing air and fuel.

For ease of starting in cold weather an electric vaporizer was used to supply a combustible mixture.The operator simply pushed the vaporizer switch for 30 seconds, then moved the starter switch to "Start", and the engine fired within 2 or 3 seconds - even though the oil in the crankcase, S.A.E. 40 at 10 F. was as thick as grease.

The electric primer was continued until 1934, constantly improved - yet a great feature.

To conclude the discussion of the Series 9 engine we should mention the intake system. In all details it was engineered. The so-called "Trombone Manifold was conceived to give the nearest possible equal distribution of fuel, air and pressure. To increase the brake mean effective pressure no heat was used to vaporize the mixture except in cold weather. In addition, the driver with the dash controlled needle valve could lean the mixture down - so that surprisingly high miles per gallon of fuel were obtained.[4] Possibly today this would be dangerous with compression ratio of 9 to 1 - but the Series 9 had only 3.98 ratio, operating with fuels of 50 octane. In the days of the Series 9 little was known of the "Knock Characteristics" of fuel - the term octane was not used in comparing fuels.

No records are available regarding the early use of Stewart Vacuum Tank for lifting the gasoline from the tank to the carburetor. Apparently some cars were manufactured with a pressure fuel system. However, we do know the majority of Series 9 cars used most successfully the Stewart Vacuum Tank. In this, the suction exerted by the intake manifold induced partial vacuum in the upper chamber of the vacuum tank so that the gasoline was forced into it from the main tank by atmospheric pressure. From the vacuum tank the gasoline flowed to the carburetor by gravity.

While some of the above remarks might be considered critical, they are certainly not so intended. They are purposely intended to show how the fundementals of design of 44 years ago have contributed so much to power plants as we know them in 1960.

Of late much has been said and written about the possibility of aluminum engines. Yet Franklin had, since 1905, used aluminum crankcase, often aluminum oil pans, aluminum transmission cases, aluminum center core in the rear axle and in many more locations in the car.

TRANSMISSION

The Series 9 had its transmission located under the toe board. It as connected to the clutch through flexible universal joint discs.[5] At the time it was not appreciated that these discs acted as very capable torsional vibration absorbers. However, after the Series IOA had been in production a short time it was found that the majority of the cars had excessive transmission gear rattle at 28 to 32 miles per hour. The Series IOA had the transmission mounted directly on the rear of the engine with no flexible coupling. John Burns found that when he incorporated a rubber disc in the clutch of the Series IOC the gear rattle dissappeared. Every car with gear transmissions built in 1960 uses a flexible clutch design pioneered by John Burns in 1923.

The Series 9 transmission was ot the selective type having three forward speeds and one reverse. Gears and shafts were made of heat treated nickel steel. The case and cover were of cast aluminum from the Oberdorfer Foundry in Syracuse, and in 1960 still most active.

As we look at this transmission in 1960, it seems way oversize and needlessly bulky. In the Series 9 the objective was a design giving long life with no failures. In 1960 the gear transmission design has been lessened for the more popular automatic with the result that transmision trouble with gears is more common.

4. See ACN of December 1959 for account of amazing mileages by Series Nines.

5. First Series 9s used Spicer type joints all around.

REAR AXLE

The Series 9 rear axle, a semi-floating type, not only transmitted the engine torque, but also the brake load since the transmission brake on the rear of the transmission passed its load down the propeller shaft and to the wheels and tires to the ground through the rear axle.

The Franklin Series 9 as well as the Series 8 rear axles incorporated a housing assembly followed in general design in 1960 by many cars. Rambler, Studebaker, Ford Falcon, Mercury and Comet all use a center housing into which is pressed and riveted a steel tube on each side. To these tubes are welded or riveted steel forgings or malleable iron castings which carry the brake assemblies and bearings. The ring gear and pinion as well as differential parts are essentially the same in 1960 as in 1915 except for the use of hypoid drive. This, of course, is done to lower the drive line.

The center housing of Franklin cars, other than the Series 17 and the Olympics, was an extremely sturdy design. Until 1929 it was cast of aluminum with a high zinc content of 16%. This material was extremely ductile - the proof of ductility was the "Digney Test". Harry Digney, president of Oberdorfer Foundries often threw the housing casting from the roof of the six story Franklin plant down onto the concrete floor of the court. Examination of the fallen castings always showed them to be in perfect condition.

The aluminum castings were replaced by malleable iron because of cracking, much to the chagrin of Mr. Digney. With today's knowledge of casting technique there need have been no reason to discard the aluminum.

The Franklin design of axle was less costly to manufacture because it used fewer pieces. The ring gear and pinion were carried directly in the center casting while the more expensive designs now, as back in the Twenties, use a separate carrier assembly which is bolted to the axle housing. A cost differential of approximately $3.00 per car counts up to big money when production reaches one to two million per year.

It would be possible to concentrate the entire discussion on the design of the Series 9 rear axle. However, it is felt sufficient to conclude this by simply saying Franklin led the industry in the design of its rear axle and has been copied continuously - even though many of the present rear axle "experts" were not born when the Series 9 axle was designed.

FRONT AXLE

Franklin cars (except the Series 17 and the Olympic) used a tubular front axle design. To the nickel steel tubes were riveted on each end drop forged yokes of nickel steel. The knuckles of chrome-silico-manganese steel forgings were held by nickel steel pins. For great strength every part of the front axle was heat treated. Each front wheel was supported on a Gurney 100% Radio Thrust Adjustable Ball Bearing carrying as much end thrust as radial load.

The tubular design front axle was indeed more costly to manufacture. It was used because it was considerably lighter than the conventional forged type. Light weight suspension parts contributed to a light unsprung weight - and light unsprung weight contributed to excellent quality of riding. Franklin always excelled in comfort.

Race cars seen each year at Indianapolis continue to use tubular front axles, because they are stronger and lighter.

Earl Buchman once owned this 1919 Series 9B

BRAKES

Until 1928 Franklin incorporated a service brake located just to the rear of the transmission case. By its very simplicity it was universally admired. Its adjustment was so simple. Its cost of replacement was very low since only one lining was involved. The design did a very commendable[6] job in braking the Series 9 because the car was light in weight (2,700 pounds in th Sedan) and not high speed - Maximum 47 M.P.H. However, as we all know in later years with heavier and faster cars, four wheel brakes were a necessity.

The emergency brake was the double acting contracting hand type. By means of the hand lever at the left of the driver, braking effort was applied to a pressed steel brake drum bolted to each rear wheel hub. The emergency brake was truly an emergency brake and did a fine job in stopping the car when needed.

CHASSIS SPRINGS

Franklin cars in 1916, as in 1934, were outstanding in quality of ride. The use of full elliptic springs, front and rear, combined with a management determined to continue Franklin as the most comfortable motor car in the automobile industry made this so. Mr. Franklin, Mr. Murphy, Mr. Barton, and Mr. Marks spent many hours in riding Franklin cars, as well as competitive cars - Cadillac, Packard, Pierce Arrow, and other cars in its class.

Unfortunately the bank management which took over in 1931 was responsible for the Franklin Series 17 and the Franklin Olympic having semi-elliptic springs. Mr. Edward Marks, then Chief Engineer, was overruled when he specified full elliptics.

It is hoped that the automotive engineers will again review the possibilities of the full elliptic springs. They have great possibilities for further improving the ride.

The 1919 9B Roadster of Burrell P. Jones

ELECTRICAL

The Series 9 incorporated a 12 volt electrical system. My father often explained this feature by talking about the efficiency of the starter, the generator, and the battery. Quite naturally this was over my head, but in later years I better understood his 12-volt arguments, especially when I had attempted to hand crank a 90 horsepower Franklin aircraft engine with a 6-volt system. It simply wouldn't kick over. But, it did with the 12-volt.

Besides the greater efficiency from the generator, starter and battery, smaller cables could be used since the current flowing with 12-volts was approximately 50 per cent of that flowing with 6 volts. The same reasoning, by the way, was followed by the automotive engineers when 12-volt systems became universal in 1956.

Quite naturally I was most proud of the Dyneto single unit starter-generator.[7] Its design was the subject of great interest at the dinner table, as well as family gatherings at the grandparents.

6. ***The multiplication of pressure on this brake between foot and rear wheels was of the order of 39 to 1.***

7. ***Late 9Bs used the North East unit.***

Since the unit was connected to the crankshaft with a chain it cranked the engine when the dash switch was closed. When the engine speed increased to the point where the drain of cranking was zero and the speed increased a bit, the current flowed into the battery to replace that drained in cranking. When the engine speed decreased so that current flowed in the other direction the starter cranked the engine. Truly, it was a non-stall system as long as the starting switch was on "Start" position.

For touring the driver could at will stop the unit from over charging the battery by simply putting the switch in "Neutral" Later my father developed a low cost voltage-regulator so the battery was properly charged without any attention whatsoever required of the driver.

The Franklin Series 9, as well as most Franklins for many years, used the Willard threaded rubber 12-volt battery. It was costly even in 1915. If I recall, approximately $50.00. Yet it had unusual life. I recall one in my father's Series 9B performed perfectly for 8 years. Nowadays three years is exceptional.

Most owners of Series 9 cars usually had ten dry cells placed under the front seat next to the storage battery to supply ignition current in an emergency. Then, of course, the starter switch was put in "Neutral", and the engine hand cranked. Yes, each car was supplied with a crank.

The lighting system was quite simple as compared to that found on today's cars. The head lamps were 21 candle power; the side lamps and dome lamps were 4 candle power; and the tail, speedometer and panel 2 candle power. Complicated high and low beams were unknown.

The Series 9 used the Atwater-Kent open circuit ignition system. It was designated as open circuit because the contact points were open the greater part of the time in operation. As a result the current drain was quit low. On the Series 9B cars a Master Vibrator was added to help in cold weather by maintaining a "hot" spark at the plugs.

In the housing of the "Unisparker" distributor was a centrifugal "governor" for automatically advancing the spark. The characteristics of the advance were developed to match the requirements of the engine based on dynamometer tests. The same procedure is used in 1960. Unfortunately the "Unisparker" was quite fragile and often failed. It was under these circumstances that the "non-stall" starter so nicely furnished the power necessary to move the car into a parking location. This happened to our family car many times on Clinton or Salina Streets in Syracuse. Later the closed circuit system was used and this trouble disappeard.

CHASSIS FRAME

In 1960 when the name Franklin is mentioned invariably the question is asked "Wasn't that the car with the wooden frame?" The wooden frame was used most successfully from the first Franklin until 1928. It was eliminated because the Franklin car had become longer - 119" to 128" wheel base, and excessive sag developed on the side rails.

The Series 9 incorporated a simple 3-ply laminated ash frame. It was very light, strong and had the ability of absorbing vibrations similar to that of a wooden hammer handle.

The frame rails were made up of three pieces of kiln dried ash glued together then put through a waterproofing process, in a creosote bath. Sometimes a frame would rot, but the replacement of a side member of the frame was quite simple. This is hard to believe, but true.

By today's standard of design the Series 9 frame was extremely weak. Cross members were very simple - three of them were wood and three were of very light sheet metal. Today we wonder how the car remained together. Possibly the answer was simply that the construction was flexible. The Series 9 stayed together.

BODY

As mentioned briefly the Series 9 body was sheet aluminum fastened to a second growth ash frame. It was expensive requiring many hours of hand work. However, in the 1915 period labor averaged $1.25 per hour.

This body was upholstered in the finest leather. And one of the best known salesmen of this leather to Franklin was the late Mr. George Mason, later President of Nash Motors. The leather was beautifully applied by craftsmen. I well recall the time when my father with a gallon of sulphuric acid in the seat beside him on a trip from Syracuse to our home town 18 miles away had the misfortune to sit in a pool of this acid after the bottle had fallen over with the cork out of position. He lost the seat out of his pants, his underwear and the leather seat - but, he gained a beautiful red on the part of his anatomy

normally used for sitting.

Franklin went the limit on quality. The floor boards were first covered with the finest linoleum, on that was placed rubber mats and on that a thick waterproof paper was added. My father's Series 9B was used for four years before we wore through the paper. The family never did enjoy the linoleum. In fact, it never wore through the rubber.

While Franklin Series 9 in later years offered 7 body types, the most popular, of course, was the touring car with a one man top, using neverleak material. Roadsters and touring cars featured "Collins Always Ready Curtains - with door curtain openers".

Unfortunately little information is available on the features of the sedan models. However, I can recall my pleasure when Ray MacCollum, the dealer in Rochester, stopped off at his mother-in-law's home next to my grandmother's with a new Series 9 Sedan. To me, age 15, it was the perfect automobile, nickel-trim—and high up in the air. Then the public was not looking for a very low car. (I wonder if the public does now. possibly we misunderstand.)

Many automobile enthusiasts, when discussing the Franklin, often remark "Franklin was surely a beautiful car. A great car. It had the sloping hood like a Renault." It is a tragedy that a hood other than the sloping type was ever used because it marked Franklin as a different automobile. Possible when Franklin management felt it had to copy the design of "water cooled" designs - its departure from the pinnacle of leadership was initiated.

TIRES AND WHEELS

In every detail Franklin engineers endeavored to keep weight to a minimum consistent with adequate reserve strength. For many years, the Series 9 did not use detachable rims. It was argued that the separate rim increased weight. Therefore, not until customers demanded an inflated spare tire was a separate assembly used.

Front and rear tires on the Series 9 were 32x4 inches, Goodyear cord, ribbed tread front and all weather tread rear, with Goodyear quick detachable rims, which were used until this model went out of production in 1922.

SHIPPING WEIGHTS SERIES (9B)

Series 9A - 75 lbs. less

Touring Car	2445
Runabout	2320
Four Passenger Roadster	2450
Brougham	2720
Sedan	2770
Demi-Coupe	2455
Demi-Sedan	2550

Johnathan C. Tibbitts sent us this forlorn looking Nine

Some points on identification.

Windshield were vertical on ALL body styles of the 9A. Later production cars all had slanted shields.

Sloping hood used from first 9s through 1920. FIAT type hood used in 1921 and 1922.

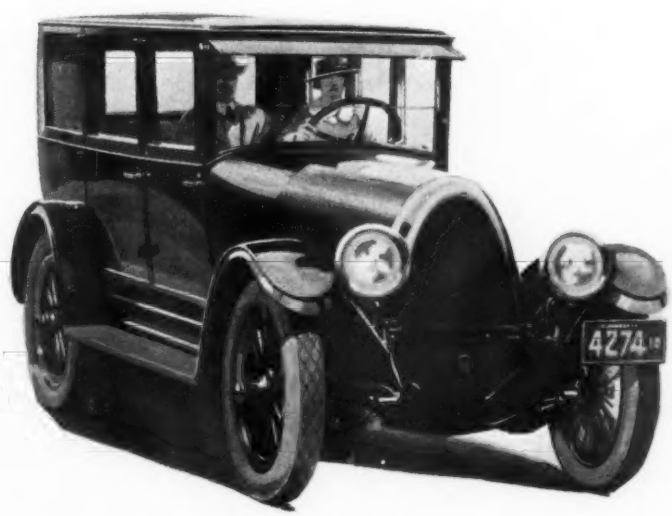
Rear curtains in the tops of cars had two oval celluloid windows from beginning through 1919. Starting in 1920 they used a single glass window for the remainder of production.

CONCLUSION

I am leaving for the conclusion the story of the gasoline tank. It was located at the rear and held either 13½ gallons or 12 gallons. This difference of 1½ gallon was often the source of a tendency to family arguments. It seemed that each member tried to operate on this reserve of 1½ gallons (by putting the lever on the tank in the reserve position) without telling the next member desiring to drive the vehicle. The result was running out of gasoline - walking home, as our town had only one source for gasoline - The Elbridge Garage. The entire situation was usually reviewed around the dinner table. My father, the judge, the peacemaker, often concluded with "one more of these senseless arguments and I will fix that gas tank so there is no reserve—"

Yes, the Series 9 was a great automobile. Its design was envied. Its greatest contribution was the groundwork it laid for many great Franklins and competitive cars to follow.

❖ ❖ ❖



Specifications

MOTOR. Horse Power—25.3.
Cylinders—Six, 3¼ x 4 inches, cast individually.
Valves—In head, enclosed.
Intake, 1⅝ inches diameter; Exhaust, 1⅝ inches diameter. Material, vanadium steel.
Pistons—Aluminum.
Crank Shaft Bearings—Seven, plain.
Timing Gears—Helical type, enclosed, running in oil.
Cooling—Air-cooled by direct application of separate currents of air to each cylinder.
Engine Base and Oil Pan—Aluminum.
Oiling—Recirculating type, force feed, through hollow crank shaft to bearings and cylinder walls.
Oil Capacity—1½ gallons in sub-base.
Ignition System—Special Atwater-Kent, with platinum irridium breaker points.
Control—Throttle control by lever at top of steering post; also foot accelerator.
Spark advance automatically regulated.
Carburetor—Special Franklin design and manufacture. Automatic auxiliary air valve maintains uniform mixture. Needle valve and hot and cold air controls on dash. Heater for intake yoke.

CLUTCH. Type—Multiple disc, running in oil. 12 bronze discs, 11 steel discs.
Location—In flywheel.

TRANSMISSION. Type—Selective.
Speeds—Three forward, one reverse.
Location—Amidships.
Bearings—Gurney Radial ball bearings throughout.
Gear Reduction—Intermediate, 1.767 to 1; Low, 3.15 to 1; Reverse, 3.375 to 1.

DRIVE. Rear Axle Gear Reduction—3.92 to 1.
Universal Joints—Four, Spicer type, of nickel steel.

AXLES. Front—Tubular, with 100% Radio-Thrust ball bearings on wheels.
Rear—Semi-floating, with 100% Radio-Thrust ball bearings. Spiral bevel gear and pinion of nickel steel. Shafts of chrome-silico-manganese steel.

WHEELS, TIRES. Open Cars—Front and Rear Tires, 32 x 4 inches. Enclosed Cars—Front and Rear Tires, 33 x 4½ inches. Goodrich Silvertown cord, ribbed tread, or Goodyear cord, ribbed tread front and all-weather tread rear. Rims, quick-detachable Goodyear, straight side.

SPRINGS. Type—Full-elliptic front and rear.
Dimensions—36 x 1¾ inches.
Material—Chrome-silico-manganese steel.

BRAKES. Service—Double-acting, contracting band brake on transmission brake drum, operated by pedal.
Emergency—Double-acting contracting band brakes on rear wheel brake drums, operated by hand lever on the left.
Material—Service: Chilled cast iron. Emergency: pressed steel.

STEERING. Type—Worm and Gear.
Bearings—Gurney Radio-Thrust.
Connections—Ball and Socket type.
Wheel—18-inch diameter, corrugated rim.
Location—Left, with center control. Turning circle, 41½ feet.

WHEEL BASE. 115 inches; Tread—56 inches.

GASOLINE TANK. Location—Rear of frame. Stewart Vacuum System feed.
Capacity—13½ gallons total. Main, 12 gallons; reserve, 1½ gallons.

BODY. Material—Sheet aluminum on second-growth ash frame work.
Top—One-man top with Collins Ever Ready curtains on Roadster and Touring Car. Door curtain openers.
Ironed to receive light demountable winter top.

ELECTRIC STARTER. Dyneto lighting and starting unit connected to the crank shaft of the motor by silent chain; operated by the same switch on the instrument board that controls the ignition.

ELECTRIC LIGHTING. Open cars—Electric headlights with double bulb equipment for intense lighting and dim lighting. Tail light, inspection light, panel light and speedometer light.
Enclosed Cars—Electric headlights with double bulb equipment for intense lighting and dim lighting. Tail light, inspection light, panel light and speedometer light. Dome light, corner reading lamps and step light for Sedan, Limousine, Brougham and Town Car.

EQUIPMENT. Windshield—Rain vision and ventilating. Two-piece adjustable glass for all cars. Sedan and Brougham have V-type windshield.
Speedometer—Warner, driven from transmission shaft by worm and gear.
Timepiece—Waltham.
Kellogg power tire pump.
Single tire carrier on rear.
Full set of tools, including jack and tire repair kit.

Prices of Franklin Cars are F. O. B., Syracuse, N. Y. The right is reserved to change prices, type, construction or equipment at any time without notice.

Franklin Guarantee

Adopted from the Standard Warranty for Passenger and Commercial Vehicles, Approved as to Form by National Automobile Chamber of Commerce, Inc.

WE WARRANT each new motor vehicle manufactured by us, whether passenger car or commercial vehicle, to be free from defects in material and workmanship under normal use and service, our obligation under this warranty being limited to making good at our factory any part or parts thereof which shall, within ninety (90) days after delivery of such vehicle to the original purchaser, be returned to us with transportation charges prepaid, and which our examination shall disclose to our satisfaction to have been defective; this warranty being expressly in lieu of all other warranties expressed or implied and of all other obligations or liabilities on our part, and we neither assume nor authorize any other person to assume for us any other liability in connection with the sale of our vehicles.

This warranty does not cover any labor charges for replacement of parts, adjustments, repairs, or any other work done on Franklin cars.

This warranty shall not apply to any vehicle which shall have been repaired or altered outside of our factory in any way so as, in our judgment, to affect its stability, nor which has been subject to misuse, negligence or accident, nor to any commercial vehicle made by us which shall have been operated at a speed exceeding the factory rated speed, or loaded beyond the factory rated load capacity.

We make no warranty whatever in respect to tires, rims, ignition, horns or other signalling devices, starting devices, generators, batteries, speedometers, or other trade accessories, inasmuch as they are usually warranted separately by their respective manufacturers.

Franklin Automobile Company, Syracuse, N. Y.

The Factory Tests The Series Ten

This series of pictures was loaned to us by member Sam A. Smith, Jr., of Pittsfield, Massachusetts.

Member Smith's uncle, Charles A. Smith of Brattleboro, Vermont was a member of a test crew who, along with the Stellman brothers and George Texada, drove a pair of Series IO's from Syracuse to the West Coast in July of 1921. Mr. Charles Smith was a close friend of both Stellmans and always drove Franklins himself. L. M. Stellman was Chief Engineer of Franklin at the time of this test run, his brother W. E. Stellman operated a precision machine shop in Brattleboro where he regularly machined pistons for Franklin. George Texada was Experimental Engineer for Franklin at the time, he later left the company to become the engineer for Standard Oil of California.

A tunnel in Shoshone Canyon.

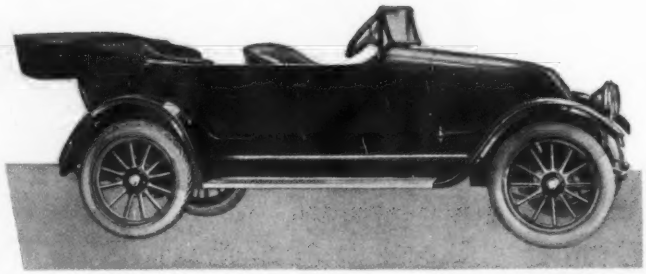
Coming down into Wyoming Valley, near Powell, Wyoming. Alt. 4800 feet.

Fording a stream in Blewett Pass, 35 miles from Wenatchee. Summit of Blewett Pass is 41 miles from Wenatchee, Alt. 4071 feet.

Tioga Pass Highway between Mons Lane and Yosemite, California

Snowbanks in Paradise Valley, July 29, 1921. Mt. Rainier National Park. L. M. Stellman, W. E. Stellman, George Texada, Mr. Wicks of Seattle.

Franklin Series 9

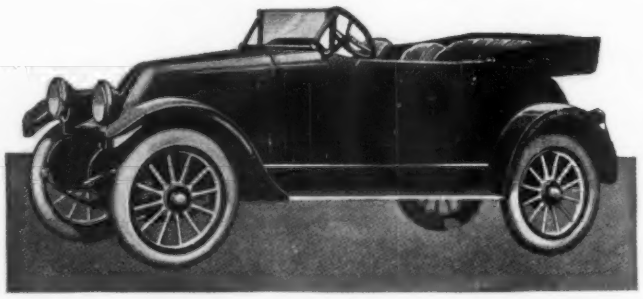


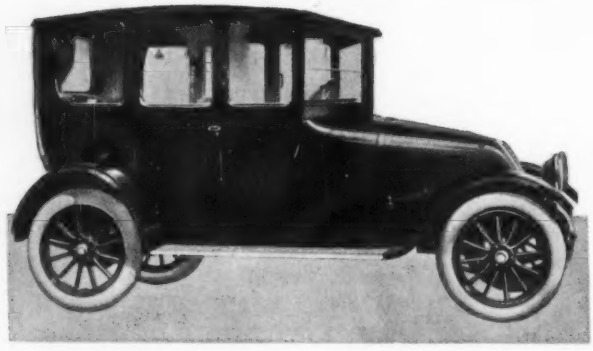
Touring Car

Weight, 2280 pounds
Five passengers
Price, $1850

Four-Passenger Roadster

Weight, 2250 pounds
Four passengers
Price, $1850



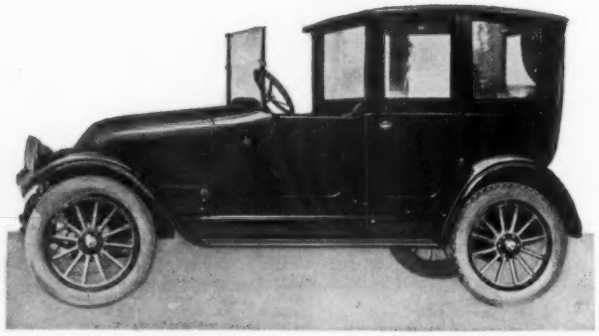


Sedan

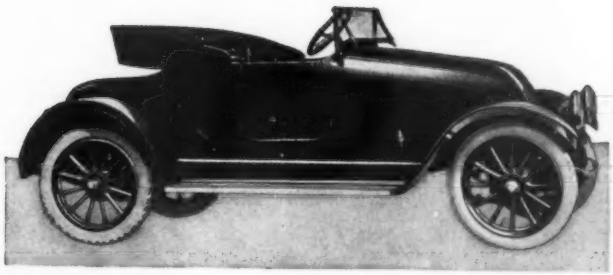
Weight, 2585 pounds
Five passengers
Price, $2750

Town Car

Weight, 2680 pounds
Five passengers rear compartment,
two passengers driver's seat
Price, $3000

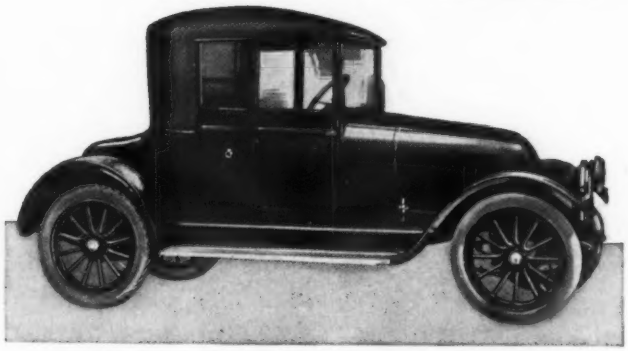


Franklin Series 9



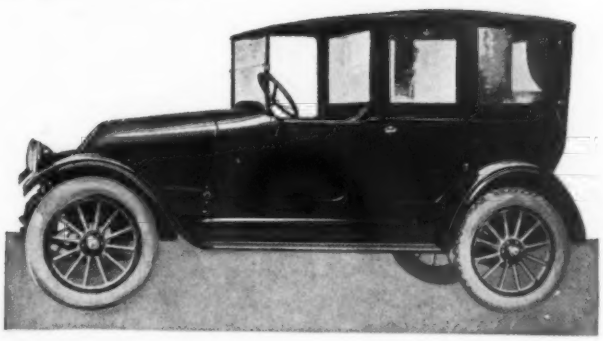
Roadster

Weight, 2190 pounds
Two passengers
Price, $1800



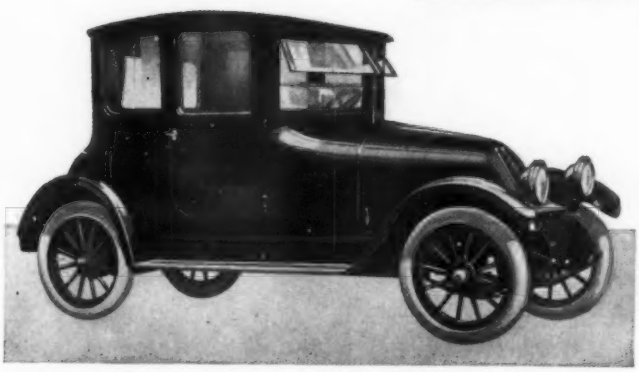
Cabriolet

Weight, 2550 pounds
Three passengers and auxiliary seat
Price, $2650



Limousine

Weight, 2690 pounds
Five passengers rear compartment,
two passengers driver's seat
Price, $3000



Brougham

Weight, 2540 pounds
Four passengers
Price, $2700

Less Weight and More Power for New Franklin

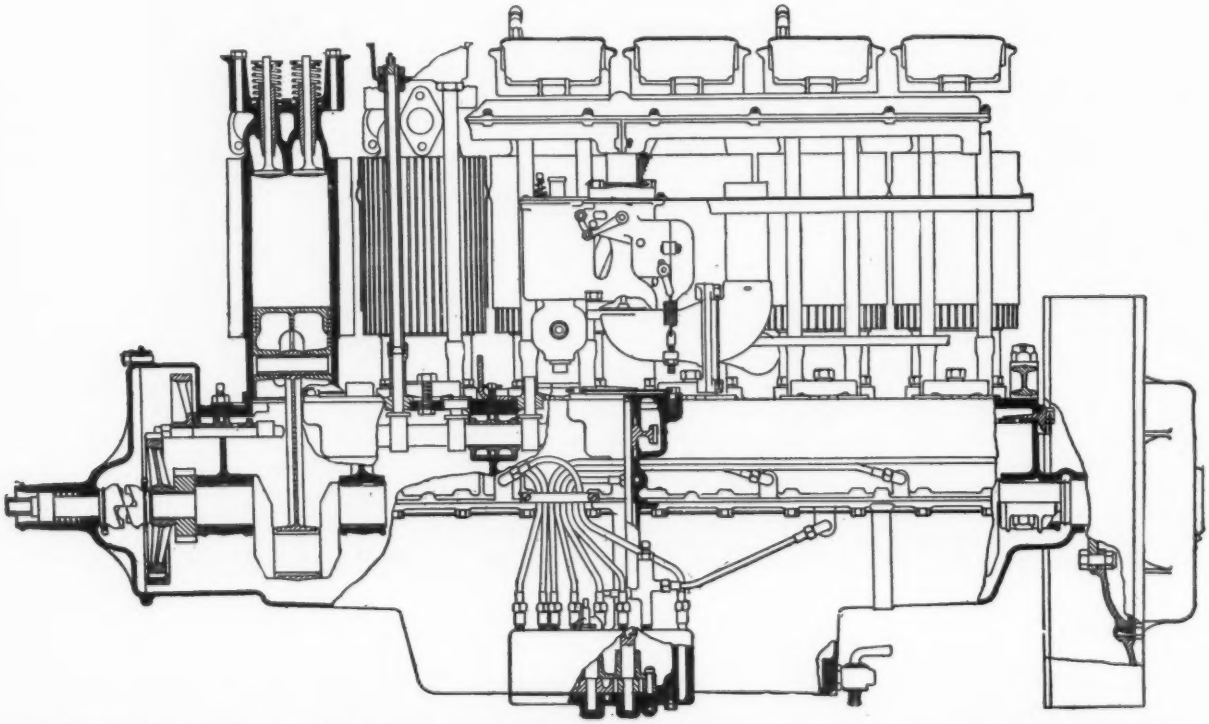
This is what THE AUTOMOBILE of July 27, 1917 had to say about the new Series 9

THAT the H. H. Franklin Mfg. Co., Syracuse, N. Y., had a new model in preparation was known to a few over a year ago, which means that the chassis now announced has had a very great amount of work put into it and has been tested with especial thoroughness. The results of this careful preparation are quite remarkable, for the new car is a very considerable advance on previous Franklins, good though the latter undoubtedly were.

400 Pounds Saved

The 1916 Franklin has been generally accepted as the lightest comfortable touring car of its capacity in the world, this low weight being obtained by scientific design, careful choice of material and elimination of every superfluous pound of metal. That as much as 400 lbs. could be trimmed off it without depreciating performance or comfort was a surprise even to the Franklin engineers, but this has been done and both performance and comfort are improved thereby. This large amount of weight has been saved without making the car smaller. The new engine is lighter, being a trifle smaller in the bore, the gearset has had several pounds cut out and both axles are lighter. All the petty details have been examined with a microscope, so to speak, and ounces cut here and there; more forgings and fewer castings are used and aluminum takes a bigger part than ever.

The general lines of the chassis remain almost unchanged. The air-cooled engine, now 3¼ by 4 in., is externally similar to the old 3⅝ by 4 in.; the wood frame, full-elliptic springs front and rear, and the amidships gearset are all retained; in fact, it needs a close examination of the chassis to find the changes. Externally the finished car has been improved in appearance very greatly. The sloping hood has had rounded corners substituted for the square ones, and it is wider, making a flush joint with the cowl all the way around. The bodies have also been rendered smoother and every one in the whole range of types is as good looking as another, the closed styles being, perhaps, especially distinctive. Also a new design of four-passenger roadster, which is not a clover leaf, is likely to prove popular, as it has all the close-coupled effect and is much easier to enter. There are divided front seats and a back seat in just the same relationship as in a clover leaf, but the doors are almost double as wide as usual. When open, the door allows entrance to be made to either front or rear seat. Still easier entrance to the rear seat can be had if desired, by tipping the front seats, both of which are hinged so as to fold forward.



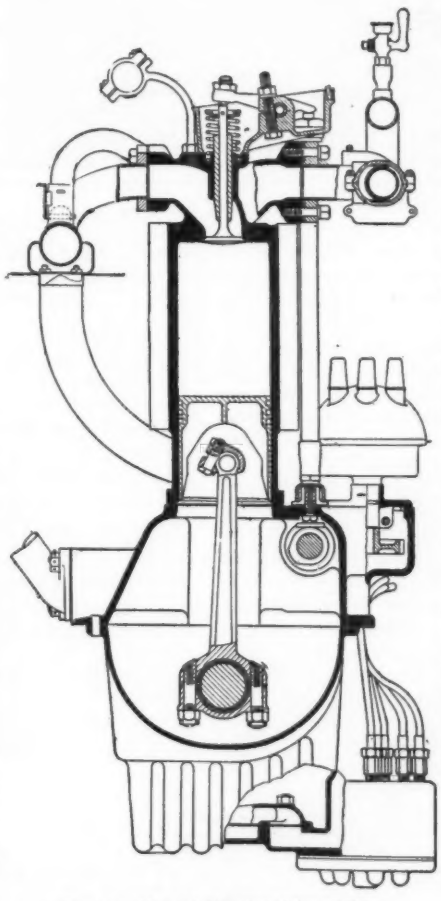
Section of the new Franklin air-cooled engine 3¼ in. by 4 in. This is on much the same lines as the former type but is a little smaller, though producing slightly more power. Atwater Kent ignition has been substituted for the magneto and the use of a Stewart vacuum feed allows the carbureter to be placed higher

The sedan and brougham bodies have been altered by the substitution of a V-front windshield for the flat pattern, and the lines of sides, front and roof have been blended in a particularly happy way. It is not too much to say that the whole closed car range resembles the best class of custom body work. Great care is taken with the detail finish of all the bodies, and one noticeable point is the solid way the doors close; in fact, the bodies all give the impression of weight and massiveness; it needs an examination of the unfinished shell to realize how very opposed to the truth this impression is actually, for they are light as well as strong.

The principal car of the Franklin series is, of course, the five-passenger touring job, which sells for $1,850. The four-passenger roadster costs $1,850 also, and there is a two-passenger roadster at $1,800, this having a very big boot under the rear deck which would hold enough baggage for a 3 months' tour. The sedan costs $2,750 and the brougham, which is merely a smaller sedan, $2,700. In addition to these cars, there is a limousine for $3,000 and a very smart town car at the same price, while the eighth model is a cabriolet selling at $2,650.

Engine Not High-Speed Type

Although it produces its maximum of 31 hp. at a higher speed than the maximum of the older motor, the new engine is hardly a high speed design, the peak of the power curve coming at about 1700 r.p.m. The maximum torque is 112 lbs. and occurs at a little over 1000 r.p.m. It is a small engine, the 3¼ by 4 in. dimensions for the six cylinders making the total piston displacement 199 cu. in. and the formula horsepower is 25.3. On high the gearing is 3.9 to 1, the wheels being 32 in., which means 1950 revolutions of the engine per mile, or a total displacement of just under 390,000 cu. in. per mile. Since the weight is under 2300 lbs., this gives a large ability, which is evidenced on the road by rapid acceleration on high. The maximum speed of the car is 50 m.p.h. or over. That is to say, 50 m.p.h. is reached easily and more under favorable conditions.



Cross section of the Franklin engine

The engine is 150 lbs. lighter than the old power plant, but, apart from the reduction in bore, it is little changed. The air-cooling system is exactly as before, save that the flywheel with its multiple blade lower construction is now an iron casting instead of being built up. Vertical steel fins are made integral with the individual cylinder castings by having the iron poured around the strips of steel and very light aluminum jackets guide the air draught downward from the heads of the cylinders.

The overhead valve mechanism has been lightened in detail, so that there is less inertia in the operating parts, and the point of contact with the rocker on the valve is so shaped that the action of the rocker cannot put any side stress on the valve stem, so causing wear on the guide.

The most marked change in the engine is the substitution of Atwater Kent ignition for the magneto. The Franklin engineers consider that this battery system gives better results at low speeds and equal results at high rates of revolution, while it is again an opportunity for saving weight. For control of the ignition point the Atwater Kent automatic advance is used, there being no spark lever on the steering wheel. Lighting and starting are performed by a Dyneto single unit machine driven by silent chain and located at the front right end of the engine; it is very accessible and the wiring is also simplified to the last degree. All the important junctions, fuses, etc., are carried on a panel in the cowl board and the spare bulbs for the lamps are also held in sockets on the same panel, so that they are perfectly protected and always accessible in a hurry. The carburetor is the standard Franklin design, with which the various economy runs have been made. It has been raised considerably and now has a Stewart vacuum feed from a rear tank.

Incidentally, it is stated by the manufacturers that the new model with its reduced weight will be able easily to break all previous economy records, and that the average man using the car in the average way without taking any special care for economy ought to get well over 20 miles per gallon. This, of course, being a minimum and not a maximum. In other words, the economy is improved in the same proportion as the weight is decreased.

New Aluminum Piston Type

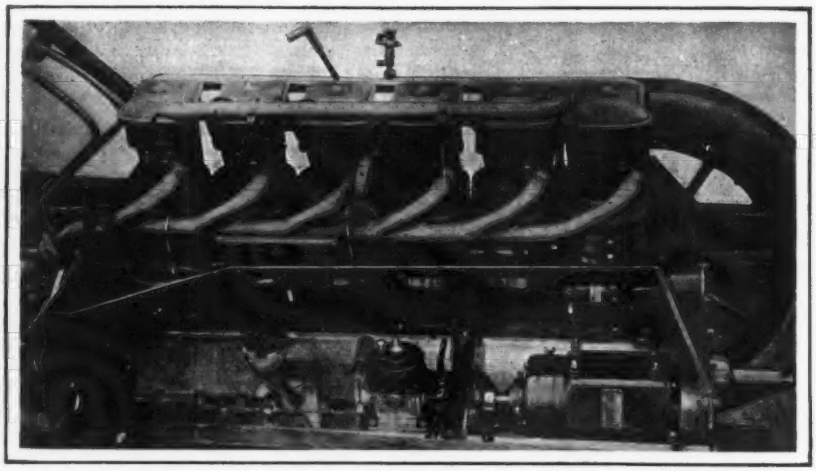
Seeing that the normal working temperature in the Franklin engine is distinctly high, the makers were not very ready to believe in the aluminum piston, but they have now adopted it as stock practice and consider that the better mean effective pressure of the new engine is largely due to the improved piston cooling obtained. At first there was a little trouble from wear on the skirt; it was difficult to get a close enough fit to insure absence of slap without abrasion. The trouble was overcome completely by turning a shallow, square groove of screw thread form from the bottom of the skirt to just beneath the lower ring. This holds oil securely and allows a smaller clearance than is possible with a plain piston.

There is an interesting lubrication system employed, individual oil supply being sent to every point. The oil pump, which is a conventional gear pattern, is mounted on a large plate, and the delivery from the pump is distributed to a number of oil leads by means of passages in the plate. Actually the plate is die-cast aluminum with distributing grooves, and these grooves are made into closed passages by putting a piece of thin sheet copper over the face. This gives direct pressure feed to all bearings on the crankshaft and to various other points.

Bearings and details on the underpart of the engine are now more accessible because the boot or under cover has been abandoned, the sides of the crankcase being now joined to the frame sills by sheet aluminum guards, leaving the bottom of the crankcase exposed. The elimination of the under cover also aids in reducing the weight.

Gear Shaft Location Changed

The previous Franklin gear set appeared remarkably light, but the new design is still lighter. Instead of being side by



Franklin engine, showing mounting of motor-generator, tire pump and horn

side, the shafts are now one above the other and the square shaft has been replaced by a splined one. Three speeds are provided and it is noteworthy that the second gear is very quiet in operation, probably owing to the stiffness caused by the short shafts and very compact case. The gear shift lever is housed on the top of the case, working in an adjustable ball joint; it is a tube with solid ends brazed in, thus being very light though stiff. The emergency brake lever has been removed from its central position and is now on the frame at the driver's left, where it lies well forward and out of the way. It does not obstruct the entrance from the driver's side, and its absence from the middle position makes more foot room. There is no intermediate linkage for this brake, as the pull rod goes direct from the lever to the rear axle. The clutch is unchanged, and the foot brake is still on the back of the gearbox, operating with great power and smoothness.

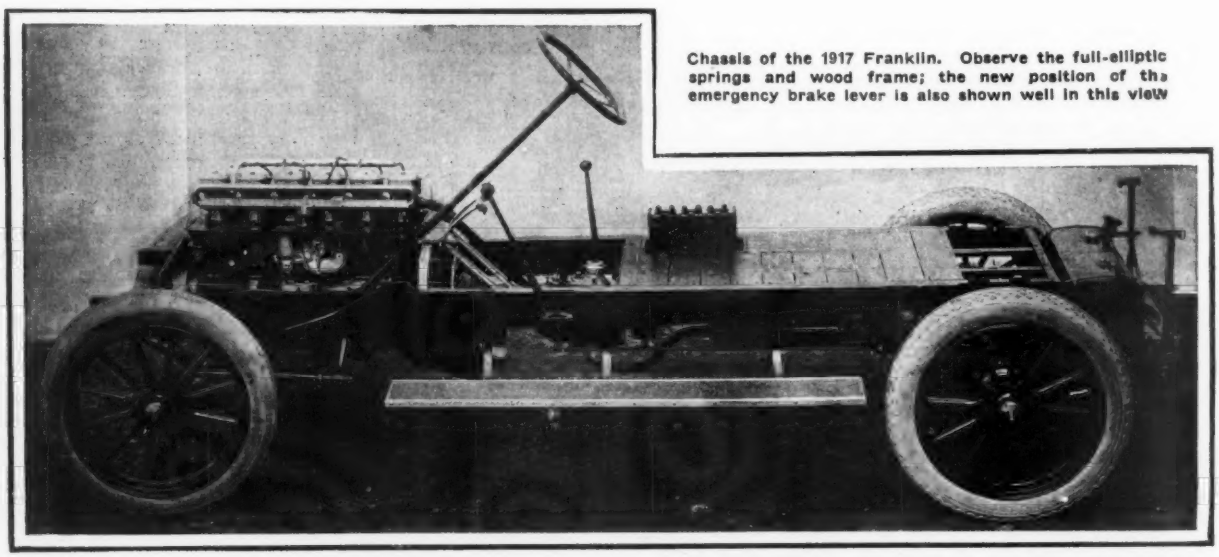
Despite the smaller weight and also despite the fact that the springs are shorter, the new car rides much better than the last series. A really rough railroad crossing can be taken at 20 m.p.h. without shaking a passenger off the seat. The explanation of this is in the axles, whence a large amount of weight has been taken. From the rear axle 25 per cent of its original weight has been removed, and from the front axle 30 per cent. This is due to the use of finer forgings and the elimination of some redundant parts.

Another effect of the small weight is to make the car so easy to steer that the first impression on taking the wheel is that something has come undone. The effort required to move the wheel is so slight that a child could steer the car easily, and a woman could drive all day without tiring her arms. There are no cars made anywhere in the world that steer more easily and extremely few that are as light to handle. The facility of control extends to the clutch, brakes and gear shift, all of which move without effort.

There is no need to itemize the fittings. All the customary equipment is given, and all of it is of good quality in keeping with the character of the car.

In regard to equipment, the cowl board has been well arranged, the clock and speedometer both being under the driver's eye, while the carburetor control and the switches are ready to his right hand. The horn button is mounted on the side of the door, where it can be operated either by the hand, or by side pressure of the knee, and a complete tool kit is contained within the upholstery of the door, each tool being in a special clip. The compartment has a lock.

A single tire carrier is built in conjunction with the gasoline tank brackets, and provision has been made for attaching luggage at the front of the left running board. Strap loops are mounted to retain the straps which secure trunks or other luggage, and on the inner edge of the running board stops are properly placed to hold the trunk in position. The luggage space accommodates a two-suit-case trunk, 10 in. high and 15 in. wide, and 30 in. long. Tires on the open cars are 32 by 4 in. and 33 by 4½ for the closed models, to allow for the different body weights.



Chassis of the 1917 Franklin. Observe the full-elliptic springs and wood frame; the new position of the emergency brake lever is also shown well in this view

Société des Automobiles à Refroidissement par Air

We are indebted to J. van Groningen for most of the material on this interesting French air cooler of the Twenties. We are also indebted to David T. Davis for his translation of the French copy which proved beyond our own A E F brand of French. We are furthe indebted to Hans van Groningen for his somewhat erroneous belief that we do not need translations.

We have located no original photographs of the SARA so can only hope that our platemaker will do her best with the poor material we have to offer. The story immediately following is a translation from LA VIE AUTOMOBILE of September 1922.

We believe M. Faroux is pretty far off the beam in his historical opinions in the first part of his article. Air cooling began on his side of the Atlantic many years before the advent of the SARA in 1922. We well recall using a French V-8 air cooled engine that was designed before 1909.....Ed.

Although there are not many novelties at the Salon, there is at least one of serious importance and which in itself alone is going to attract all the visitors. It is no less than the famous "air cooling" of which much has already been heard without knowing exactly what it is all about. This title is the appelation given, in its country of origin; America, to mechanical cooling of air.

The S.A.R.A. (Societe des Automobiles a Refroidissement par Air) is the first concern this side of the Atlantic to have tackled this interesting problem and it has achieved the rare distinction of having created a most remarkable machine at the first trial.

I declare at this point that the air cooled motor to be found at the Salon constitutes the first European application of this automotive principle. It is not a question, in effect, of a simple engine with fins, like certain cyclecar motors, with cooling by simple radiation, but a motor with forced cooling whose essential organ constitutes an air turbine.

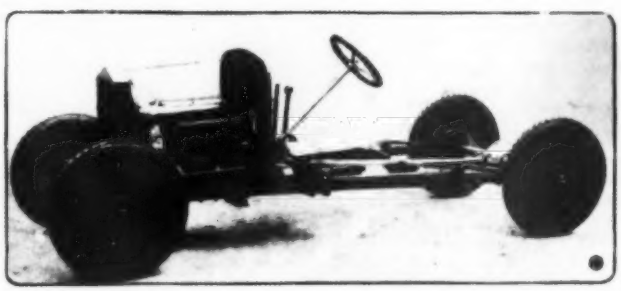
Already a long time has passed since the question of air cooling was studied and put into effect in America where interesting results have been obtained, but the reasons for which this system of cooling have undergone steady development are certainly not the same, or at least are not of the same importance as those which impel its adoption among us.

The prime reason for its adoption in America lies in a question of economy of construction realized by the elimination of the radiator. There are other equally important advantages such as the diminution of weight of the vehicles (water, radiator, cooling system and pump), the elimination of damage as a result of freezing, etc., interesting advantages above all in a country like America where some areas undergo a very severe climate and where water is scarce in some sections. These divers advantages attract to these cars a faithful clientele assuring prosperity to several large firms which have brought out these cars and have established their worthiness based on this principle.

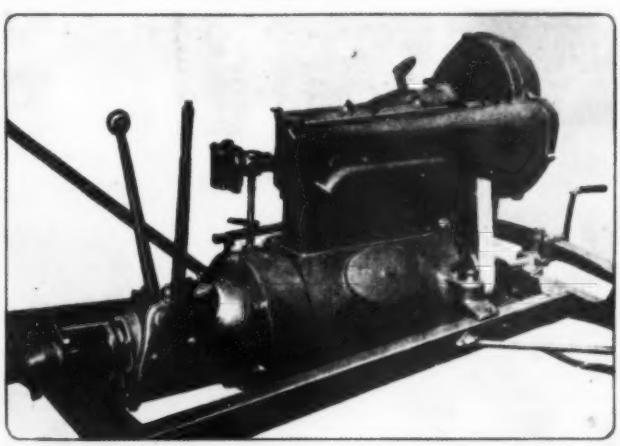
We cite foremost the Franklin firm which builds only air cooled cars with four or six cylinders of 82x101 dimensions and produce them at the rate of 6,000 a year; there is also the Holmes car with six cylinders 90x108; the Page four cylinder; the Fox Motor with six cylinders 83x129; the Sun four cylinder car. This necessarily incomplete listing will give an idea of the development of air cooling in America.

In France the primary reason for its adoption is a technical one. Every motorist now knows what the thermal output of a motor is, or at least has heard of the basic importance of it, notably in the matter of gasoline economy. The internal combustion engine is a machine which transforms heat into energy. Unfortunately, this transformation is not efficient. Only about one third of the heat produced by the combustion of the fuel is transformed into energy; a third goes out the exhaust and the final third is absorbed by the piston and cylinder walls. To increase the output we must therefore lessen these two wastes and the efforts of engineers are based on numerous factors. It is from the race tracks, we may say that above all the era where the displacement was limited by rule. which has given rise to the numerous improvements which have brought the automobile to the present stage of perfection. However, certain aspects alone of this thorny question of thermal production have been seriously worked out. Thus we believe keenly in the linear speed of pistons, which lessens the duration of contact between the burning gases and the cylinder walls and ,consequently the amount of calories given up by them; to the same end we lessen the importance of points of contact, from which we use combustion chambers as nearly spherical as possible; likewise we have increased the compression ratio, thus lessening the calories lost in the exhaust gases and increasing the power of the motor.

But in all these processes, progress at first was extremely painful; increasing piston speed and compression ratio brought with them new problems of lubrication, ignition, and carburetion. quite difficult to resolve and whose realization was perhaps not justified by the enormous amount of work and research which it had to entail.



The Chassis of 1922



The 1922 Engine

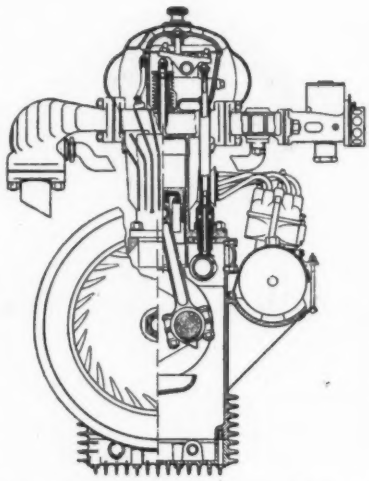
Thus, it is not astonishing that engineers have been won over by the study of new solutions which further advance the technique of the internal combustion engine. Among those betterments which seem most easy to come at, there is one which, up to now, has scarcely had attention from the theorists, at least in Europe; it is the one which concerns improving the cooling of the cylinder walls.

Granted they have worked hard, in the course of laboratory experiments, to replace water with a liquid with a higher boiling-point. But, further than their knowledge of how in this way to raise the cylinder wall temperature by a few degrees, this would involve the use of a costly liquid which would be impractical and also less economical. This is why the S.A.R.A. squarely left the beaten paths and concentrated exclusively on air cooling, pushed to the point where they obtain excellent cooling, regular and certain, true cooling necessary and indispensable, which permits the difference in temperature between the gases and the cylinder walls to greatly diminish. The ideal would evidently be to allow the cylinder walls to assume the same temperature as the exhaust gases but would be prevented by seisure of the engine.

We are limited in this course by the critical temperature of the oil which must preserve its lubricating qualities. Air permits close approach to this result whereas the use of water goes away from it.

The theoretic advantages which have led among us, the S. A. R. A. company to create this type car which is the feature of the 1922 Salon have been practically demonstrated on the American cars equipped with air cooling and all the economy meets there which have been won by similar vehicles. If to this economy of consumption we add the economy of maintenance, the reliability as certain in warm regions as in cold ones, we understand why firms like General Motors and Ford are now studying this system, which is surely the cooling of the future and which will give excellent results from the time it will have been seriously studied as a method of obtaining intense and regular cooling.

The essential problem is to create an apparatus to produce a sufficient air current If we are, in France, somewhat backward in adopting air cooling it is probable that on the question of realization we are already ahead. The American machines are, on the whole, cumbersome, generally inaccessible and unesthetic.



End sectional view of the air-cooled S.A.R.A. engine.

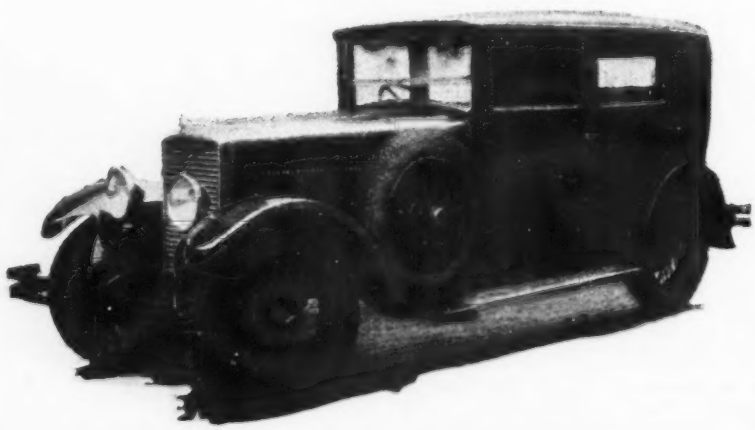
The French apparatus which S. A. R. A. has adopted is characterized by a simple, light sensible and economical arrangement. It is at once a scientific and elegant solution by an eminent engineer, M. Tisserant, who in collaboration with M. Piazzoli, has solved in a practical way the problem of air cooling and one may judge the result of their labors when one learns that their motor, of 1100 c.c. and which is not a racing motor, but rather designed for retail trade, has given, according to tests in the laboratory of the Automobile Club de France, at a speed of only 2,668 rpm, a power of 28.93 H.P. and which gives perfect idling at a speed of 210 rpm, proving thus that the air turbine gives out enough air at all speeds to assure good cooling. The same motor gave 32 H.P. at 2800 rpm and has idled as slow as 185 rpm.

It has four vertical cylinders which are separate and of 62 millimeter bore and 91 millimeter stroke. Each cylinder is equipped with vertical fins which increase the cooling surface and also guide the air currents which come in the upper part of the cylinder and escape at its base. The arrangement of the fins has been studied in order to avoid all air pockets. The four cylinders are enclosed in a cast aluminum housing in which a turbine fan mounted on ball bearings and driven by two spiral gears brings in cooling air at a pressure of 90 millimeters of water at 1500 rpm. The casting has in its upper portion a large and easily demountable cover so as to permit inspection and lubrication of the air ducting systems and which shows the careful systems of passages and canals to insure equal distribution of air currents to the fins of all four cylinders. The air taking off the calories which must be eliminated, escapes from the bases of the cylinders at a temperature of about 100 degrees and is expelled toward the rear of the car.

The air-cooled six-cylinder engine of the S.A.R.A., showing the blower on the front end of the crankshaft.

The cooling obtained is perfect and more rational than that of water, the delivery of the air being, in part, a function of the speed of the motor and consequently to eliminate heat and besides, being augmented by the speed of the car, the intake cone of the turbin is working facing ahead.

All the verifications which have been made after prolonged trials, on the condition of the cylinders and of the valves, the coloration of the metal informs us in exact fashion as



The six-cylinder air-cooled Sara saloon looks quite normal.

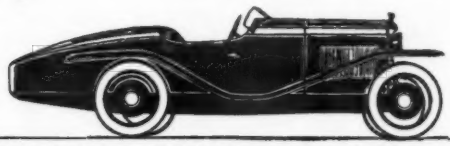
De snelste en meest elegante Fransche

SPORT-AUTO

voorzien van nieuw systeem Turbine Luchtkoeling (thermo-controle.) 4 Versnellingen. 4 wielremmen. Superbe veering. Comfortabel. Ligt vast op den weg. te luxueus afgewerkt. en wordt geleverd met complete uitrusting.

Geen lekke of bevroren radiateur. geen bijvullen: winter en zomer steeds gereed.

SARA „verovert Uw hart"



CONTINENTALE AUTOMOBIEL MAATSCHAPPIJ
STADHOUDERSKADE 100 · AMSTERDAM

HAAGSCHE AUTOMOBIEL MAATSCHAPPIJ
KONINGINNEGRACHT 11 · DEN HAAG

The fastest and most elegant French

SPORT CAR

equipped with new Turbine Aircooling (thermo-controlled) 4 speeds, 4 wheel brakes. Superb springing. Comfortable. Holds well on the road, is luxuriously finished, and delivered with complete equipment. No leaking of frosted radiator, no refilling: winter and summer always ready.

SARA "conquers Your heart"

to the temperatures attained by the cylinder walls, prove that no criticism can be made of such cooling as is here accomplished.

The turbine, which at most absorbs a force of 3 H.P., is thus less than the amount absorbed by certain fans in water cooled cars and is driven by the aid of a large endless flat belt made of camel's hair, tension being adjustable by an eccentric. In tests, this arrangement has given satisfaction and has shown the ability to run more than 5,000 kilometers without need of tightening the belt. However, in case, although nearly impossible, of a rupture, a distance thermometer would warn the driver immediately that the turbine was no longer operating. Circulation of air is accomplished by two butterflies adjustable from the dashboard and which permit adjustment of the air delivery.

Apart from the air turbine and the modifications that its use has brought, the S.A.R.A. motor exhibits numerous features more ingenious one than the other and of which I cannot do otherwise than to describe, as they are part of an absolutely remarkable ensemble and which will preserve for automobile history the merit of having been, in France, the first application of the principle whose evolution is going to be speedy.

The crankshaft is very robust, more robust than that of many 10 and 12 H. P. cars. It is dynamically balanced and mounted on two ball bearings. The camshaft, placed at the bottom of the cylinders, and run by helical gears operates the 30mm valves in the ratio of two per cylinder. Lubrication of the mechanism has been neatly solved. Small levers placed between the cams permits a lift of 8mm. which gives excellent engine breathing. Return springs placed below the lifters keep the valves, lifters and cams in permanent contact and thus suppress a cause of noises.

Force feed lubrication by a gear type pump is absolutely automatic. The automatic feature is obtained in an extremely simple manner by four troughs whose sides are of unequal height, the front face less elevated than the rear face. While running or stopped, the front face forms the overflow level, when climbing hills, the rear face plays this role and its height and bulk allow a higher level to exist in the trough and thus more lubrication. Going downhill, an inverse phenomenon occurs. This is a solution both simple and sure which permits regular consumption of scarcely 300 grams in 100 kilometers while giving lubrication whose efficiency is attested by the state of the aluminum pistons, which, after long tests, showed nó trace of wear or ovalization.

The intake manifold, on the right side and fastened directly to the cylinders, carries a Solex carburetor at its extreme rear. Either magneto ignition or an automatic advance distributor is used. The mounting has been arranged so that these units are interchangeable. The clutch is of the cone type, lined with Ferodo. The gear box with three speeds forward and one reverse represents another little novelty with gears of only three types. It is en bloc with the motor and weighs only 94 kilograms, including the clutch and brake pedals and the carburetor, thus giving interesting freedom for chassis construction.

The advantages of an air cooled motor are again shown by the chassis on which it is mounted and which deserves mention. Profiting from the gain in weight of the motor, they have been able to give it respectable dimensions. The frame is trapezoidal and suspended at three points; in front by a transverse spring and at the rear by two oblique demicantilever springs placed in the extensions of the chassis side rails and giving an excellent suspension. I have tried out this chassis and have been enthused by the way it holds the road. I know scarcely any heavy cars which can compare.

The car literally sticks to the road, the worst cobblestones give the impression of a boulevard ride. This result is obtained first by having the cantilever springs do nothing but cushion the ride, further by the use of two torque arms, mounted parallel with and above the demi-cantilevers and which, since they absorb the horizontal thrust of a jolt, keep the chassis on an even keel. These arms at the same time play the role of safety factors in the event of spring breakage.

I would have much more to say about this chassis, as much about the brakes as the transmission, the steering, lighting and accessories, but it would necessarily lengthen too much my object: the presentation of "air cooling".

I will content myself, in closing, to advise my readers to go and see at first hand this chassis in which there is no one mechanism which does not represent a remarkable personal solution, where the practical side and the safety side are treated with as much mastery as the scientific and mechanical sides.

For the rest, a few words in conclusion will suffice to give a concrete idea of the described solutions. With an essentially commercial motor in which nothing has been sacrificed for strength and durability, the S.A.R.A. car, although carrying a large two-seater body which is comfortable, weighs only 350 kilograms and will easily do 100 kilometers an hour with a fuel consumption of 5 litres per 100 kilometers.

By 1928 the SARA had developed into a six cylinder with a bore and stroke of 66x88 mm for a displacement of 1806 cc. Our pictures show this larger engine and one of its body styles, a four door sedan.

Among features of this engine is a two piece crankshaft carried in three ball bearings. A feature of the cylinders is that each one is complete with its valves, push rods and rocker arms and such assemblies may be removed as units. The valve operating mechanism is contained in an oil tight housing.

The main point of interest in the car itself is its unorthodox suspension. A quarter elliptic spring has its butt end attached to the chassis and the end of the main leaf attached to the underside of the axle housing with a ball & socket connection. This spring effects suspension only, while the drive is taken by a second spring having its butt rigidly fixed to the axle and its forward end pivoted to a bracket on the frame.

M. FAROUX

❖ ❖ ❖

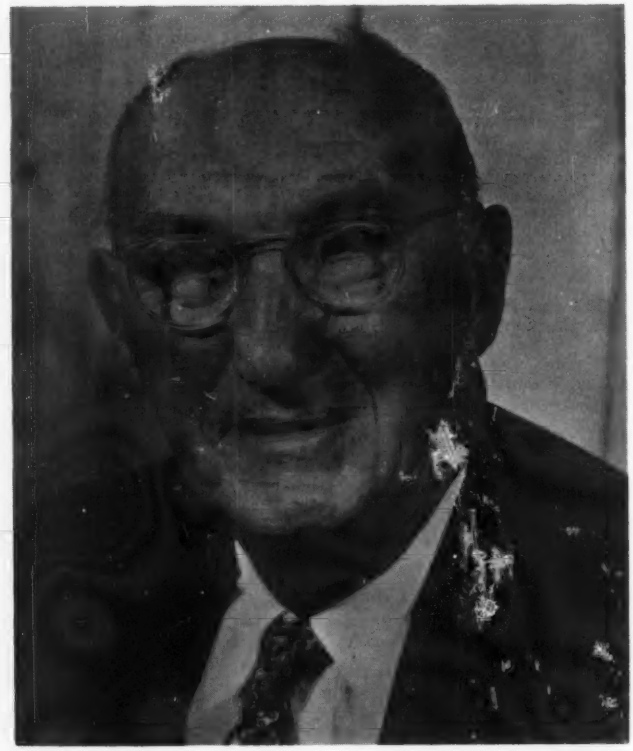
E. G. Baker

SEE PAGE 20 **CONCLUDED**

Bake and I never had a cross word even when his Pikes Peak 4-wheel drive race car wouldn't move because the front wheels turned opposite to the rear wheels. But I took plenty of kidding. Such occurences, when properly handled, coordinate an activity as everyone becomes an integrated part of the project.

Bake's passing was a serious blow to me. I learned of it in the Ford office elevator when a business associate said, "Bake left in a hurry." I asked him to repeat the statement. Bake is gone, yet our memory of him, his contributions and his great character will endure for years to come.

C. T. D.



1882 E. G. Baker 1960

On May 11, at Indianapolis, Indiana, member Erwin G. Baker passed away after suffering a heart attack in his 78th year.

He was known to many of us as "Bake", to the world at large as "Cannonball". Maybe someday someone will write his full spectacular motoring history. It will be almost unbelieveable. His close friend of over thirty years, Carl Doman, has written some brief details of Bake and his association with the Franklin.

In 1926, Cannonball borrowed a Series IIB Franklin touring car from the Indianapolis dealer and tested in the "Baker style" this vehicle for 100 miles on Indiana roads. He was most enthusiastic as he experienced for the first time an automobile with most unusual roadability. He reasoned that with this car he could easily break the coast-to-coast record. So he contacted Mr. Franklin, and later came to Syracuse for a conference.

It was decided to let Bake have a Series IIB car and equip it as he directed. The equipment, among many innovations, included a toilet built into the rear seat.

Bake was satisfied with the car so he drove to New York City so he could officially start on his ocean-to-ocean trip.

From New York he headed west with directions to Mrs. Baker to meet him on the way in Indianapolis with a big pan of hot dogs and rolls and coffee. Bake didn't believe in taking time out to eat.

At Indianapolis he was well ahead of the record, but misfortune hit him a few miles west when the No. 3 connecting rod bearing failed.

The car was brought back to Syracuse and the engine was installed on the dynamometer for the purpose of determining why the failure occured. Here the dynamometer showed the cause---Since No. 3 connecting rod bearing was fed from the center main bearing, the oil flow decreased as the center main became enlarged due to excessive loads at 2750 R.P.M.

Every type of bearing material was tested but none would stand up. It was very evident that counterweights were needed. It was decided that since the Series 12 long stroke car was to enter production in a few months that Bake should forget attempting to break the coast-to-coast record with the Series IIB, so he concentrated on the Series 12.

Again, when the car was completed, Bake took the car to New York for the start. Again he set up a tough schedule and, in fact, exceeded his schedule until in the midwest when he lost the brake fluid and was lost for hours in an area where brake fluid in 1928 was not available.

So again Bake went back to New York and started again. This time everything worked according to plan and he broke the record to the West Coast. He contacted Hugh Goodhart and together they headed back to New York City with hopes of breaking the round trip record. This he did, and Franklin was known from coast to coast as a car with dash--with speed. It was no longer known as the old man's car.

This change, in the public's opinion, was primarily due to Bake's perseverance, but a bit of the praise was due the engineering department for designing the vehicle.

Of course, Bake was constantly breaking other records and all of us were enthused. Possibly I was most thrilled when I was assigned at age 28 to do anything that Bake requested. Quite naturally, I was eager to please and in my efforts to please, we worked closely and we became close friends---and remained such until his death.

Quite naturally, Mrs. Baker and their only son were elated with Bake's success. Then a tragedy struck the family---the son developed an ulcerated tooth and in a matter of hours had passed away.

A great change came over Bake and Mrs. Baker. They lost their enthusiasm and for the first time required the combined efforts of all of us to keep them going. Both were clean living people, with deep religious convictions. Time, of course, helped Bake to get back in the speed groove, but Mrs. Baker remained a broken woman and so remained until she passed away, possibly ten years ago.

Fortunately, for Bake, he met the widow of a minister and they married. Bake, with his bride beside him, was a new person. He spoke at the Franklin Trek in 1957 and inspired everyone with his basic philosophy of life and, incidentally, of cooling engines---with air, of course.

After Franklin had terminated its contract with Bake, due to lack of funds, he continued to break road records for various automotive companies, but to Bake these other automobiles were just "cast iron junkers" He was still "air cooled" from morning until night. Yes, and when he slept.

He conceived a rotary valve mechanism and tested his first sample on a motor cycle. The valve was a cylindrical piece of carbon with passages milled at proper positions for functioning.

Bake contacted me many times when I was Chief Engineer of Aircooled Motors hoping that we would build some sample in line rotary valve aircooled engines. Unfortunately, we could not find the funds.

After I joined Ford, Bake met me at the Dearborn Inn and we talked and talked about how we might proceed, but we never found the solution.

Bake, however, had such faith in his rotary valve that he invested his own money and built the parts to convert his Series 14 Franklin. I never saw the engine other than in photos but Bake reported great results.

It is difficult to stop jotting down events concerning our association. I could continue for hours. He influenced me and my future so much. I could tell of his betting me $5.00 that his Pikes Peak race engine could develop more power with 6 motor cycle carburetors than with one large down draft unit. It developed 30 horsepower less and he gave me the five.

Another time he bet me that kerosene with Tetra-Ethyl lead would be a superior race fuel. When we tried it, the detonation was so bad that the engine nearly disintegrated so he paid me with another five dollar bill with the statement, "Learning that was worth more than five dollars; buy yourself a new hat."

CONTINUED PAGE 19

The Proper Ratio Of Stroke And Bore In Automobile Engines

January 1912

John Wilkinson

For the designer to select the proper ratio of stroke to bore he must be able in a fair degree to measure the values of the different qualities that are inherent in the different designs. Some of the qualities, like cost and weight, can be expressed in figures with a fair degree of accuracy. Others, such as noise, can not be so expressed and, in fact, always have a variable relative value governed principally by the viewpoint of the majority of automobile users.

There are many desirable qualities that should be incorporated in an automobile engine as far as possible in order to bring the whole to the highest state of efficiency. Some of these qualities are control, quietness, weight, cost, life, vibration, efficiency. Then we have many constructive features such as T head, L head, and valves in the head, separate cylinders, twin cylinders and block motors, 2, 3 and 5 bearing crankshafts, four cylinder and six cylinder motors, two and four cycle motors—all these features bear relations to each other and many of them bear relations to the ratio of stroke to bore.

When all these questions, together with the many other points of design, are considered it may fairly be assumed that the short and long stroke engine controversy has assumed exaggerated attention. As bearing on the question of relative values of various designs, it may be interesting to note how the industry as a whole has viewed these points. The majority of makers have selected T head motors; nearly an equal number the L head and a few the valve in the head motor. The first represents the best controlled and the quietest type poppet valve motor; the second nearly as well controlled and equally as quiet, and the third the most economical and the least quiet. Most everybody has passed by the two cycle, the quietest of all, on account of its lack of control. Preponderance has therefore been given first to control and then to quietness rather than economy.

EFFECT OF RACE RULES

The so called long stroke motor came into prominence abroad firstly on account of the classification of motors in racing cars by the bore alone, and, secondly on account of the tax on horse power being so high and being measured by a formula which took into consideration the bore only, and this may still be the controlling factor. Since then it has become a standard abroad and many are used in this country.

If two engines of equal power, one with a short and the other with a long stroke, are considered for a car it should mean in the case of the long stroke a lower rotative speed, higher piston speed and a greater torque; with the short stroke, a higher rotative speed, a lower piston speed and a lower torque. The relations of piston speed have been well defined by the tests and conclusions of the horse power formula committee representing the Incorporated Institution of Automobile Engineers of England, the Royal Automobile Club and the Society of Motor Manufacturers and Traders. This committee tested some 144 engines, 101 of the tests comparing the effect of stroke bore ratio for values of R from 1 to 1.61. Their conclusion is represented by the equation.

A equals 600 (r plus 1) feet per minute where R equals ratio of stroke to bore.

This implies a maximum practicable piston speed of 1,200 feet per minute for R equals 1, rising to 2,100 feet per minute for R equalling 2.5. This gives us the required relation to compare engines of equal power but of different stroke bore ratio.

A COMPARISON

Let us take 4 x 4 as our short stroke engine and R equals 1½ and R equals 2 for the medium and long stroke engine. The relations of piston speed in the three motors will be 1,200—1,500—1,800.
Now, getting the sizes from these figures and considering mean effective pressures the same, the sizes of our three engines will be:

4 x 4	1,200 P. S.	1,800 Rev.
3.58 x 5.37	1,500	1,666
3.27 x 6.54	1,800	1,651

Now these engines, placed in the same chassis, and geared so that at any speed of the car the relative piston speeds are 1,200 and 1,500 and 1,800, will all give practically the same power. The writer has taken concrete examples to facilitate the comparison. Let us consider the qualities of these motors as regards economy, cost, weight, quietness, life, vibration and other points.

In regard to economy we can refer again to the report already mentioned, and we find that it was deduced from the results obtained that the mean effective pressure is, in general, a function of the bore and that it increases slightly with the bore. According to formula recommended the three engines would have M.E.P.'s as follows:

4 x 4	91
3.58 x 5.37	87
3.27 x 6.54	83

It will be noticed that the comparison of sizes was made on the basis of the same M.E.P., while the deduction from the tests shows this to be about 10 per cent less for the 3.27x6.54. It is unfortunate that in these results M.E.P. is only considered at or near the maximum horse power and not all along the horse power curves at various points, so that while it reasonably shows the economy of the 4x4 to be greater at or near its maximum power, It gives us no data on the economy under other running conditions.

WEIGHT PROPORTIONAL TO CUBIC CAPACITY

The writer regrets that no such data has been available for him, so that this question has to be left open, although the only evidence we have leans toward the short stroke engine as the most economical. As regards the weight, the writer believes as a matter of theory and backed up by his own practice in the case of sizes of engines of 3 1-4x4, 4x4, 4 1-4x4, 4½x4, 4½x4½, 4x5, 3⅝x4, and 3x5, that the relative weight, not including flywheel, will be according to the cubic dimensions of the motor. The strength and weight of clutch, transmission and drive shaft will vary according to the torque of the motor and will, therefore, be greater with the long stroke engine. This leaves the weight question considerably in favor of the 4x4 with the additional saving of the flywheel weight. The cost will go with the weight.

M.E.P. DEPENDENT UPON BORE

Another curious thing about the comparison which can not be lost sight of is that the 4x4 engine with the 10 per cent greater M.E.P. actually gives more horse power at the same number of revolutions than the 3.27x6.54. Therefore, if the conclusions of the committee were right, the question of weight and cost are certainly settled, and while it may be that a long stroke high strung English motor built in 1911 is lighter than a short stroke motor of older date, it is certain that with the same factors of safety, materials and intelligence of design, the short stroke motor will be considerably lighter and cheaper.

If we were to take up the question of efficiency from the theoretical side we should consider the relation of compression to piston speed, the effect of piston speed itself, and the relation of the exposed surface to the volume of charge. The higher the piston speed the more temperature the motor can stand without ill effects such as preignition and pounding, and therefore, it might seem that higher compression could be used, but this is opposed by the fact that the higher the piston speed the more heat the motor has to stand and, therefore, the increase in compression allowable must be very limited at best and perhaps not possible at all.

Compressions being equal, the thermal efficiency should be proportional to $\sqrt{ST}$, where V equals volume of charge, S equals exposed charge, and T equals time of exposure. Of course, this only takes into consideration the loss of heat into walls, and could only be used in comparison to obtain which engine might be more efficient. The long stroke motor has a greater ratio of exposed surface and longer time of exposure, so that unless it can use higher compression will be less economical.

Deductions by the committee on the relation of compression to stroke bore ratio would have been very interesting and instructive.

QUIETNESS OF OPERATION

In regard to quietness, I think that most everyone will admit that the slower the rotative speed the quieter the motor and that, based on the assumption of equal mean effective pressures, the long stroke will be the quietest but based on the formula of the committee the quietness should be equal.

As to the minor question of vibration it would probably have an equal effect on either motor if piston speed were proportioned theoretically correct, but most of the long stroke motors are of later design with abnormal piston speeds and very light pistons, so that comparisons are difficult.

It might be noted here that of the motors tested the average time of design of the long stroke was of more recent date than of the short stroke, with the consequent opportunity for improved design.

LONG STROKE FITS IN WITH BLOCK CYLINDER DESIGN

In its relation to special types it is easy to see that the long stroke motor fits in with the block cylinder design with two crankshaft bearings on account of shorter distance between bearings and lessened thrust on crankshaft. It is also easy to see that as the ratio of stroke to bore becomes more than one to one and one-half, exaggerations of designs begin to creep in, such as too short connecting rods, too large valve pockets in relation to cylinder size, inclined valve stems and guides, extra high engines, slots on cylinder sides to take the swing of the connecting rods, etc. In fact, there are such that I believe the common sense of the American designer will not allow him to go to the ratios of Europe unless it can be shown by definite tests and data that large advantages exist.

A number of our engineers have just returned from abroad, where the long stroke motor is so much used, and they may have information and knowledge which make the results of the tests on which I have relied rather out of date. If so the writer would be willing to change any of his deductions which can be shown by more recent work to be wrong. Based on the report of tests it has not yet been shown that the long stroke motor is as economical or as light or as cheap or any quieter or any longer lived or superior in any way. We are left to believe that perhaps the tax per horse power is the strongest factor in the design, at least of English motors.

We, on this side of the water, should have some reason beside popularity for the adoption of a new design. What we need is characteristic horse power curves, efficiency tests at different speeds and loads, the latest practice in piston speeds and compressions, weights of motors and the other data necessary to give us a sound basis for selecting the best ratio of bore to stroke, and to eliminate the effect of the newness and advertising value of any design.

The above interesting article is through the courtesy of member John B. Johnson, publisher of the Watertown Daily Times, Watertown, New York.

Watertown Daily Times
ESTABLISHED 1801
WATERTOWN, NEW YORK

JOHN B. JOHNSON
EDITOR AND PUBLISHER

April 26, 1960

Dear Mr. Amick:

I have been reading in THE HORSELESS AGE, January 17, 1912, an article by John Wilkinson of Franklin, entitled, "The Proper Ratio of Stroke and Bore in Automobile Engines". It shows very clearly that at least by 1912 Wilkinson was so far ahead of his times that it wasn't until 1949 that Cadillac and Oldsmobile and then the rest of the industry began to catch up with him. I call this article to your attention on the chance that you might want to reprint some of it in one of your issues of Air Cooled News.

With best wishes, I am,

Sincerely yours,

John B. Johnson

Mr. A. H. Amick
Air Cooled News
Cumberland, Maryland

❖ ❖ ❖

Comments

Dick Hall stated in his story that the HOLMES valves could be set as close as .003 and would not change over .001 under operation. He now writes that a 1921 owner's manual that he has since inspected recommended a setting of .025 when hot. The previous supposed settings were quoted from a booklet published by the Holmes Company. This is a considerable discrepency in advice and Dick, being without Holmes experience, stands in a neutral corner.

In one of the issues we grouped what we considered six ***unassociated*** items under the general title of MISHMASH. Webster says it means "medley", we loved the word and were glad for a chance to use it. Low and behold, we receive a letter from a Classic fan berating us (gently) for calling the 1927 Dietrich and the unusual Walker by such an undignified name! Nothing was farther from our mind. The life of an editor is hard.

Member Bill Gibson, VMCCA Librarian and nationally known Marmon authority brings our attention to an error in the little squib about aluminum engines. It seems that the Marmon "34" had a cast iron liner rather than a steel liner as we stated, their steel liner was developed for the Sixteen brought out in 1931-1933. Our own knowledge of Marmon is much limited, we took the "steel" business without questioning it from some of the correspondence we had on this subject.

John Burns Column

The John Burns Column was formerly personally conducted by the late Mr. Burns. In future it will be handled by a board of Franklin engineers and special experts who, out of their wide experience, will undertake to assist members with their technical problems. In addition it will from time to time, as before, contain tips and suggestions sent in by members.

All correspondence for this column should be direct with the Editorial Office at Cumberland, Maryland. You will be expected to furnish this office with copies of your questions and the answers for possible inclusion in this column.

CAM MEASUREMENT

Joseph James of Hempstead, Long Island asks:

Can anyone furnish the measurements of the cam lobes on the cam shafts of cars from 1931 on? I have three shafts and they are all worn differently. If I could get hold of a car with only a few thousand miles on it and get as near the original size as possible I could then have the shaft metal sprayed and machine the lobes.

Answer by Mr. Doman:

Unfortunately, when my wife cleaned the attic, my precious camshaft prints were burned or something. Furthermore, I designed the 1930 and later cams on our dining room table night after night, so maybe she was trying to get back at me.

The best I can suggest is to measure from the back of the cams to the maximum lift and select the one with minimum wear as the master and duplicate that. We used to allow up to .015" difference in production, so possibly the cams aren't worn as much as they seem. If this wont work, I will get the help of some friends at Van Norman Machine Company to help

SWAPPING HORSES

John A. Hawkins of Peoria, Illinois writes:

Somehow I would like to have the fine DeCausse bodies of aluminum, with wooden frame, of the '28's and the power of the '29's and later. Do you know if a '29 or later crank shaft could be put in my 130 or in a Model 12 block, or were the blocks enlarged too? Another question: Could the cylinders of my 130 or a Model 12 be bored out 1-4" for the '29 and later pistons, and are the cylinders long enough to make allowance for the 3/8" longer thrust up and 3/8" longer thrust down of the pistons? Or, would the cylinders of the '29's fit the block of the 130's and Model 12's? I presume I could save a lot of trouble by replacing the old, smaller bore and stroke motors with a 1929 or '30 motor, but I would like to keep the original engine number.

Mr. Doman replies:

The crankshaft used in the 1929 is the same as that used in the Series 130. The stroke is 4¾". The bore of the 1929 Series is 3½", while that of the Series 130 is 3.25".

The cylinder of the Series 130 could not be bored out. The 3½" bore cylinder is from a different casting.

Some 1929 Series 135 and Series 130 used the same crankcase, so the cylinders were interchangeable. I suggest the use of the larger 3½" bore engine with 272" piston displacement rather than trying to convert, if more power is needed. However, if it were I, I would leave the engines alone.

CLUTCH STUDS

A. H. Amick, Cumberland, Maryland writes:

The six studs that carry the bronze disks in my 1912D are badly worn for an inch or so below the cover plate. What sort of stock should I use in replacement?

Answer by Mr. Buchman:

What is needed here is something better than cold rolled stock, I have found Pump Rod (someplaces called Well Rod) to be very satisfactory. It is very tough but not hard to thread. Pump service dealers and many hardware stores carry it. (Note by AHA: I find that some hardware stores do not know the difference between this and ordinary cold rolled, "better check")

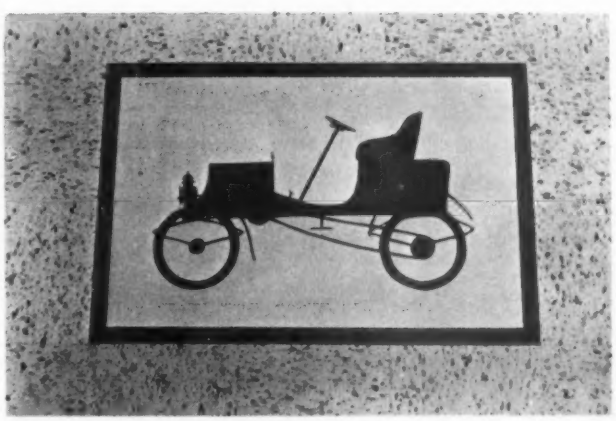
DETERGENTS AGAIN

The arguments about detergent oils continue. The differences of opinion are by no means confined to old car people, in the garage where I have our moderns serviced several advise me against them, several say they are all right.

I had a bad experience with a Franklin due to detergent oil, another member and an experienced man from the service point of view, had exactly the same experience with his Franklin using the same type of gear oil pump. In both cases the pump refused to circulate hot detergent oil, in both cases no difficulty was experienced before this oil was tried, no further trouble was experienced in either case after draining the detergent oil and refilling with the usual type of oil. I am not an engineer (I confess sadly) and my only experience with the oil business was as a clerk for an oil company many, many years ago. I will not stick out my neck by trying to refute the statements of men who do know the oil business BUT my conscience will not permit me to go along with those who advocate its use in old cars without making my protest, take it or leave it, but your editor advises against it, if you get along all right with it then your editor is an old fogy, if you stick up your engine then your same editor "told you so".

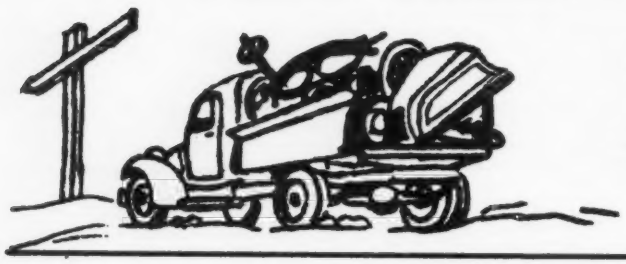
Certainly our medics will not tell us you are a dead man for sure if you eat cucumbers, also they should not deny that men have died from eating cucumbers. If my brother (I never had one) had died from eating cucumbers no arguments by a doctor or reading of a shelf of books would convince me that I should feed them to my children. My beloved '12D almost died from "eating cucumbers". I have said my piece, like Khruschev "my heart is pure".

AHA



"Bred in the bone", was long ago a commonly used expression to describe inherited prowess, aptitude or strong devotion to a cause, as for instance the prowess of a hunter or the loyalty of a Franklin man. In the case of our president we might paraphrase that to "Cut in the tile", for this is what we found laid in the floor of that loyal gentleman's study.

THE MARKET PLACE



Classified advertisements are free to members, subject to available space. Advertisements from non-members may be accepted, without charge, at the discretion of the Classified Editor.

Members are reminded that misrepresentation in advertisements may result in their being dropped from the Club rolls. They are further reminded that the publishing of their advertisements entails an obligation to answer all inquiries.

Henry C. Courten, 531 Higbie Lane, West Islip, New York

FOR SALE

1933 Sedan Model 161, Wire wheels with rear mounted spare, tires fair, Nothing missing. Motor runs well. Good battery. Some body dents but should be easy to restore. Asking $600. Might trade. O. C. Davis, 40 E. 59th St., Jacksonville 8, Fla.

1924 Series IOB Opera Coupe, low mileage, renickled, refinished in dark green and black, reupholstered in real old-fashioned mohair. Complete, will tour anywhere. Best offer over $1200.00 (Picture .25) Frank Deakin, Box 71, Middletown Iowa.

1933 Sedan, 1925 Coupe, and 1929 (body type not stated, Ed.), good for parts cars, must sell. Richard E. Franoise, Jr., 81 Wilson Ave., Avon P. O. Neptune City, New Jersey

1933 Olympic Fourdoor Sedan, engine and body in excellent condition, windows clear, recently reupholstered, good rubber, wire wheels, manual. Following spare equipment included: 1929 engine, starter, generator, oiler, manifolds, etc. Car, plus parts, for best reasonable offer. Jon. Tisdale, 401 South Street, Avon, Massachusetts.

1928 Four Door Sedan, one owner, original & perfect throughout 28,000 miles. Engine overhauled in September 1959. Parts car included. $1500.00. G. W. Walker, 109 W. Winsor Street, Montpelier, Indiana. Phone 2414.

1933 Olympic Sedan, running order, extra wheels and tires. $250.00; 1930 Model 151 Sedan plus engine and parts for 1923 also available. Ross Mack, Edinburg, N.Y., P.O. Hadley, N.Y.

Brass Script for your Franklin Small $8.50, Large $10.50 polished and postpaid, satisfaction guaranteed. Arthur Evans, R. D. No. 2, Bangor, Pennsylvania

Pair of Large, All Brass Headlamps, believed for 1928 Franklin bear stamping "Para Beam, J. W. Brown Mfg. Co." Good condition. Arthur Evans, R.D. No. 2, Bangor, Penna.

Instructions for the case and adjustment of Westinghouse Air Shock Absorbers. Important servicing and oiling reference. .75 each or two for $1.25, postage paid. Earle S. Eckel, Sr., R. D. No. 1, Washington, N. J.

Series IIA Four Door Sedan. Four new tires. Original upholstery and paint, dull. Not run for several years. Asking $200. W. C. Condit, 4746 Broad Road, Syracuse 15, New York

WANTED

Wire and Pointer for dash-oil gauge on a 1925 Series IIA. Also need "radiator" cap for 1929 Series 135. Robert W. Webb, 855 LaMilpita Road, Santa Barbara, California

Hood Latch and headlamp lens for Series IIA. Ray D. Ives, 407 South Main St., Medicine Lodge, Kansas.

Transmission for 1930 "Some light fingered scoundrel" made off with ours. Mrs. Kenneth Waggoner., 10313 Wonson Drive Camp Pendleton, Oceanside, California.

Wanted for 1931 Series 18 Olympic: new or like new exhaust and intake valves, gas gauge-ammeter combination, 12 guide rods, clutch, transmission with internal free-wheeling unit, carburetor, complete steering assembly. Sanfjord B. Teu II, 4306 South 36th St., Arlington 6, Virginia

Snap Ring for 1919 Franklin rim 24" lost on Ocean City Run. URGENTLY NEEDED! Lower half of windshield frame for 1919 Touring 9B, also sloping type hood for 9B. Dr. Edgar A. Dilks, 3601 Trindle Road, Camp Hill, Penna.

For 1930 Model 147 Roadster: pair of parking lamps with lenses, tail lamp lens, and information on authentic color schemes. Turner Matthews, 1535 1st Ave. W., Bradenton, Fla.

Wanted for 1930 Pursuit Paeton: rear tonneau cowl, rear windshield, and necessary hardware of plans for same. Tony Giaimo, Jr. 4623 Burnet Ave., Sherman Oaks, California

Babcock Bodied Franklin: Would like to hear from any owner of a Franklin with a Babcock body. Am working on a history of the H. H. Babcock Company of Watertown. John B. Johnson, Watertown Daily Times, Watertown, N. Y.

The official HHFC recognition button or pin is illustrated. It is priced at $5.50 .postpaid in 10K gold. The actual size is about one half inch. Prices of other items on request

You may order through Athel Odell, HHFC Jeweler, Galesburg, Illinois, or through the club Treasurer.

CREDITS

Front cover: "Joie de Vivre" courtesy James Beal

Our improvident cross engine pilot is in for a rough day, for even a Franklin does not progress too rapidly with an empty tank. This painting captioned, "Gasoline? Mister, there's not a drop for miles", was part of a 1935 advertisement of the Gulf Oil Corporation, or Gulf Refining Company as it was then known.

Rear cover is from the cover of a Series 9 catalog.

Franklin

Series 9

Franklin Automobile Company

Syracuse, N.Y.